Anxiety Trends in Patients Awaiting Invasive Cardiac Procedures in the Outpatient Preprocedural Unit

A Thesis

Submitted to the Faculty

of

Drexel University

by

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in partial fulfillment of the

requirements for the degree

of

Doctor of Nursing Practice

March 2013

Dedication

I dedicate this dissertation to my wonderful husband Shajimon P. George, my two precious and loving daughters Shelby and Sheryl, my parents, my mother-in-law and friends, who are the joy of my life and are a constant inspiration for me. I thank each one of you for giving me your full support throughout my years in academia. Thank you for sitting and listening to my frustrations and helping me to continue to move forward and reach for heights that seemed impossible.

Acknowledgements

Coming together is a beginning, staying together is progress, and working together is success." Henry Ford

First and foremost, I would like to thank Lord Almighty for helping me reach this height. Words can't express the solitude and peace that I found in Him in the midst of all the motions that I had during the coursework and dissertation.

Many people have helped me reach the heights or explored the depths with their help, support, guidance, and efforts. I would like to acknowledge all of those people who helped make this dissertation possible. The most important person I would like to acknowledge is Dr. H. Michael Dreher, my supervising professor and mentor. It would have been next to impossible to write this thesis without Dr. Dreher's patience, guidance, commitment, and dedication to my success. His encouragement and belief in me has motivated me in accomplishing my goal in the path of the doctoral study. He has been a great inspiration to me from the very first day at Drexel. Dr. Dreher, I whole-heartedly thank you for everything you have done for me and also for giving me an opportunity to work with you. I have been incredibly fortunate to have an advisor like you who gave me all the support and guidance even when my steps wavered and helped me complete this dissertation.

I would also like to thank the members of my dissertation committee for all the time, feedback, and dedication to my work and towards a successful completion of my research. Dr. Alice Poyss, Ph.D., was very instrumental in fine-tuning my data collection and survey questionnaire. Dr. Christine Maguth Nezu, Ph.D. and Dr. Katie Featherstone, Ph.D., have been very supportive with their valuable insights, comments and suggestions.

I would like to extend my deepest appreciation to Dr. Poyss, Dr. Nezu, and Dr. Featherstone for their wisdom, guidance and support. I am deeply honored to have such distinguished committee members who supported me in delivering the finest project.

I would not have even come up with my dissertation question without the guidance of my first advisor, Dr. Roseanne Ghalili. Her support and guidance was indeed the stepping stone. She has helped me since the beginning of this journey. Dr. Ghalili, I thank you wholeheartedly for opening your doors for me every time I wanted to talk to you and for your valuable time, continued guidance, and undying commitment to my research.

I am incredibly thankful to Anand Bhattacharya, who provided statistical help and invaluable support and guidance throughout this process. His expertise has helped me in refining and strengthening my results and helped me to place them in perspective.

I owe my sincere gratitude to Dr. Eifert and Dr. Speilberger, nationally and internationally renowned researchers, whose support and well wishes have motivated me to embrace and enjoy the research process.

I would like to express my appreciation to Dr. Barbara Granger, for providing professional opinions by proof reading my material.

I would like to extend my heart-felt gratitude to my good friend, Bincy John, for his enthusiasm, intensity, and willingness to offer technical support at any time of the day. He has also been my proof reader and helped relieve my anxiety attack by retrieving my work that was lost in cyber space many times. I thank you Bincy, and truly have appreciated your time, effort, and dedication. Without your help, this journey would have been very rough.

Special thanks to all my colleagues: Amy Padbury, Mary Malitas, Sandhra Thekkumthala, and Theresa Eiser Brown for assisting me with data collection and making my dissertation journey much smoother.

I would like to acknowledge and express my sincere appreciation to the participants in my study. I am forever grateful to you for your kindness and willingness to participate selflessly in this research, which may improve the lives of others who are dealing with heart problems and anxiety.

I am extremely grateful to my husband whose love and persistent confidence in me has led me through this endeavor and helped me to achieve my goal. He has been very patient, encouraging, and cheered me every step of the way throughout my academic journey. His words of encouragement and unconditional support were my motivation to pursue my doctorate degree.

Words fail to express the love and appreciation for my two precious daughters, Shelby and Sheryl, who were instrumental in proofreading, formatting, providing technical support and who provided unconditional love, support, and care when I was frustrated and helpless. There were times when they would feed me dinner while I sat on the computer trying to finish my papers. Shelby and Sheryl, I am so thankful to have you both in my life. I would have never made it through without you both.

Finally, I would like to thank my mother-in-law, my parents, brother, sister, and extended families for all their love, support, understanding and prayers toward this journey and for helping me to make my dream come true.

Thank you for this amazing opportunity!

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Abstract

Cardiac, State, and Trait Anxiety in Patients Awaiting Invasive Cardiac Procedures in Outpatient Preprocedural Unit

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H. Michael Dreher, Supervising Professor, PhD, RN, FAAN

BACKGROUND: Cardiovascular disease (CVD) is associated with life threatening conditions. Invasive cardiac procedures that are used for diagnosis and treatment of CVD provoke anxiety. Hence, individuals waiting to undergo invasive cardiac procedures may experience cardiac anxiety (CA), state anxiety (SA), and/or trait anxiety (TA). A high level of anxiety exemplifies the complexity of psychosomatic and physiological effects that influence the outcome of cardiac procedures and the treatment and prognosis of CVD. This study addressed the gap in evaluating the level of the preprocedural anxiety (CA, SA, and TA) and determined the difference in CA, SA, and TA in male and female patients admitted for invasive cardiac procedures so that the specific anxiety could be identified and properly treated and managed.

DESIGN: A cross-sectional descriptive study design was used. A study sample of 92 patients who met the inclusion criteria were recruited from 113 consecutive patients admitted in an outpatient preprocedural unit for invasive cardiac procedure.

METHODS: On procedure day, the participants filled out the Cardiac Anxiety Questionnaire-Revised (CAQ-R), Spielberger State-Trait Anxiety Inventory form –Y (STAI-Y), and the Demographic Data Form while waiting in the outpatient preprocedural unit.

RESULTS: ANCOVA analysis revealed that there was no significant difference in CA, SA, or TA between male and female patients. A significant difference was found in SA

in participants with and without heart disease and in CA in patients with and without a history of HTN. However, Pearson correlation (r) analyses showed significant correlation among the three variables: A moderate correlation between SA and TA ($r = 0.55$; $p < .05$); and a fair correlation between CA and SA (0.22) and between CA and TA (0.25). A stepwise regression analysis revealed that annual income was the most significant predictor of CA, a history of heart disease of SA, and no predictors contributed to TA.

CONCLUSION: Participants with TA demonstrated significant SA, and those with low income and a diagnosis of heart disease had significant CA.

1. INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death and disability in the United States (U.S.) and worldwide (Thom et al., 2006; White, 2008). The diagnosis of heart disease provokes anxiety in patients despite advanced technologies in management and treatment of CVD. There is growing evidence that anxiety is an independent risk factor for CVD, as it associated with the development of arrhythmias and sudden cardiac death (Albert, Chae, Rexrode, Manson, & Kawachi, 2005; Frasure-Smith, Lesperance, & Talajic, 1995; Moser & Dracup, 1996). Studies have shown a connection between cardiac symptoms and anxiety, but few investigators have studied cardiac anxiety (CA), a persistent type of anxiety in patients with and without known heart disease who are undergoing outpatient invasive cardiac procedures. CA is unrecognized and underappreciated which may increase visits to medical practitioners and emergency rooms and increase the need for unwarranted cardiac procedures (Eifert, 1992). Failure to identify and treat patients with CA makes them vulnerable to the adverse effects of anxiety. Early detection of the distinct type of anxiety in preprocedural settings could enable clinicians to tailor specific, individual-based treatment approaches which are vital to improve health status, reduce complications, and ensure treatment success. Therefore, this study proposes to address this gap and demonstrate the predominance of clinically relevant CA in patients waiting for cardiac procedure. It could also add to the CA research literature in the domain of preprocedural anxiety.

Invasive cardiac procedures like cardiac catheterization or electrophysiological study often provoke anxiety in patients because of the anticipated diagnosis of CVD and related procedural complications (Beckerman, Grossman, & Marquez, 1995; Davis,

Maguire, Haraphongse, & Schaumberger, 1994). CVD includes coronary artery disease (CAD) or cardiac arrhythmias, a life-threatening illness, which needs immediate treatment and/or life-style changes (Gallagher, Trotter, & Donoghue, 2010). Therefore, Csuhospital admission for these cardiac procedures to diagnose and/or treat CVD is stressful and anxiety provoking in many patients. Patients waiting for cardiac procedures in an outpatient preprocedural unit may experience cardiac anxiety (CA), state anxiety (SA), and/or trait anxiety (TA). These types of anxieties require different interventions. Moreover, anxiety is not assessed routinely in patients waiting for cardiac procedures in an outpatient, preprocedural unit.

Screening for at-risk individuals is often restricted to events and is often not captured as the evolving problem of anxiety. It is important to identify the type of anxiety and offer appropriate treatment at the earliest time to prevent anxiety related adverse outcomes. The long-term goal of this study is to develop effective screening and treatment procedures for specific preprocedural anxiety.

The objective of this particular study is to address the gap in evaluating the level of the preprocedural anxiety which includes cardiac anxiety, state anxiety, and trait anxiety in male and female patients admitted for elective cardiac procedures in a hospital-based outpatient, preprocedural unit.

1.1 Statement of Purpose

The purpose of this study is to determine the difference in CA, SA, and TA in male and female patients admitted for invasive cardiac procedures in a hospital-based, preprocedural unit so that the specific anxiety can be identified and properly treated and managed. Based on the literature review, the central hypothesis is that female patients

admitted for undergoing outpatient invasive cardiac procedures could experience higher level of preprocedural anxiety (CA, SA, and TA) than male patients undergoing outpatient invasive cardiac procedures, and patients with history of heart disease and hypertension could experience high level of CA and SA.

1.2 Specific Aims and Research Hypothesis

The specific aims of this study were four-fold:

Aim 1: Determine differences in levels of cardiac anxiety, state anxiety, and trait anxiety between male and female patients undergoing an outpatient cardiac procedure after controlling for previous history of an outpatient cardiac procedure.

The working hypotheses is that compared to males, female patients undergoing outpatient invasive cardiac procedures experience higher levels of cardiac anxiety, state anxiety, and trait anxiety.

Aim 2: Determine the differences in cardiac anxiety, state anxiety, and trait anxiety between patients with and without history of heart disease and hypertension admitted for elective invasive cardiac procedures in an outpatient preprocedural unit after controlling for a previous history of an outpatient cardiac procedure.

The working hypothesis is that patients with a history of heart disease and hypertension could have higher levels of cardiac anxiety, state anxiety, and trait anxiety compared to those with no history of heart disease and hypertension.

Aim 3: Analyze the association among cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

The working hypothesis is that there could be a significantly strong positive correlation among cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

Aim 4: Determine what health factors and socio-demographic variables best predict cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

The working hypothesis is that health factors such as history of cardiac and electrophysiology (EP) procedure, heart disease, hypertension (HTN), smoking, depression, use of alcohol and recreational drugs, and socio-demographic factors such as education, age, and annual income could predict the level of cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

The research team from Drexel University was well positioned to conduct the study. The principal investigator is a Certified Adult Nurse Practitioner (APN-BC) and doctoral candidate with over nine years of clinical experience in cardiology. Part of her doctoral education included a clinical practicum focusing on the assessment of anxiety in patients awaiting cardiac transplant, coronary artery bypass grafting, and coronary angiography with John Walter Covington Entwistle III, MD, PhD and Ralph J. Petrucci, Ed.D in an urban university hospital. The co-investigator and supervising professor has been H. Michael Dreher, PhD, RN, FAAN Associate Professor, whose clinical background is in cardiovascular nursing; he is the first nurse to complete the jointly funded NIH, NHLBI, and NINR two-year postdoctoral research fellowship in sleep and respiratory neurobiology at the University of Pennsylvania. The team also included Alice

Poyss PhD, MSN, Associate Clinical Professor at the Drexel college of nursing, whose research interests include nursing intervention and nursing treatment/outcome studies; Christine Maguth Nezu, PhD, ABPP, Professor of Psychology and Medicine in the Department of Psychology in the Drexel College of Arts and Sciences, who has conducted applied research in the area of clinical psychology and behavioral medicine. She is board-certified in cognitive and behavioral psychology with a research focus on developing empirically supported treatments for individuals with depression, various medical disorders such as cancer patients and persons with cardiovascular disease, personality disorders, and special populations; and Katie Featherstone, PhD, Senior Lecturer at Cardiff University, UK who is an expert in the sociology of biomedical knowledge and who currently works with a collaborating team to improve the diagnosis and management of angina.

The Cardiac Anxiety Questionnaire (CAQ) and Spielberger's State-Trait Anxiety Inventory Form–Y (STAI-Y) were used in this cross-sectional research design. This study was particularly innovative, because it studied CA, SA, and TA independently in an outpatient, cardiac preprocedural unit. Neither anxiety nor its specific types have been routinely assessed despite the increased prevalence of anxiety disorder in cardiology and the disproportionate utilization of medical resources and funding in treating patients with anxiety related symptoms.

1.3 Conceptual and Theoretical Framework

The Concept of Anxiety.

Anxiety is

> "a multidimensional emotional state manifested as a somatic, experiential, and interpersonal phenomenon; a feeling of uneasiness, apprehension, or dread. These feelings may be accompanied by symptoms such as breathlessness, a choking sensation, palpitations, restlessness, muscular tension, tightness in the chest, giddiness, trembling, and flushing, which are produced by the action of the autonomic nervous system, especially the sympathetic part of it" (O'Toole, 2003, p.82).

Anxiety is a detrimental emotion that arises in response to perceived threats, from either internal or external source, which can be real or imagined. Anxiety characteristics include inability to predict, control, or gain the desired results (Moser, 2007), and it has both functionally appropriate and inappropriate consequences. Anxiety is appropriate or adaptive when it triggers coping responses that protect an individual from threats. It becomes inappropriate or maladaptive when it increases or persists to a period that result in medical or psychological consequences and influences the individual's everyday life (Whitley, 1992). Patients with anxiety are at increased risk for acute cardiac events and in-hospital complications after admission for acute coronary syndrome or a cardiac procedure (Moser, 2007). As strongly supported by decades of neuroscientific and learning research, anxiety reactions occurs as a result of higher-order conditioning of the autonomic nervous system to certain environmental events and situations. Higher-order

conditioning is a process of associative learning that occurs when a previously conditioned stimulus is paired with a new conditioned stimulus (C. Nezu, Martell, & A. Nezu; in press). However, multidimensional anxiety theory (MAT) establishes a linear relation between anxiety and symptoms (Mackenzie, 2010). Using MAT, we can predict that an increase in anxiety could have a negative effect on hemodynamics, performance, and quality of life. Anxiety in patients with CVD increases sympathetic nervous system response which escalates anxiety symptoms that affect the physical, emotional, and psychological wellbeing of the person.

The Conceptual Definitions of Anxiety.

In psychology, anxiety is defined conceptually as,

> "the emotional component of biological responses to imagined danger, linked to intrapsychic conflict, clinical-physical tachycardia, dyspnea, trembling, cognitive difficulties, hypersensitivity, dizziness, weakness, dysarrhythmia, sweating, fatigue clinical-mental sense of impending doom, powerlessness; it is pathological when it interferes with effectiveness in living, achieving of goals or satisfaction, or reasonable emotional comfort" ("Anxiety," n.d., para. 26).

In psychiatry, anxiety is defined as, "a state of apprehension, uncertainty, and fear resulting from the anticipation of a realistic or fantasized threatening event or situation, often impairing physical and psychological functioning" ("Anxiety," para. 1; McCance & Huether, 2002).

Craighead and Nemeroff (2004) defined anxiety is an emotion and state of mind characterized by aversive cognitive (apprehensive expectation of negative experience or

consequences), physiologic (autonomic hyperarousal with multiple somatic symptoms), and behavioral (hypervigilance, avoidance, paralysis of action) components (p. 70).

The following independent variables measured in this study include: Cardiac Anxiety (CA), State Anxiety (SA), and Trait Anxiety (TA). Excluded groups: In this study individuals were excluded based on screening for frailty and dementia. Those individuals who were deemed frail or were diagnosed with or currently been treated for dementia was excluded from the study.

1.4 Theoretical and Operational Definitions

Cardiac Anxiety (CA).

Cardiac anxiety is theoretically defined as a specific fear of cardiac-related stimuli and sensations because of their expected negative consequences (Eifert, 1992). Cardiac anxiety is characterized by fear, worry, and uncertainty about chest and heart sensations, avoidance of activities believed to elicit cardiac symptoms, and heart-focused attention and monitoring of cardiac activity (Zvolensky & Forsyth, 2002). Cardiac anxiety is commonly seen in both psychological and physical disorders (Eifert, 1992; Eifert, Zvolensky, & Lejuez, 2000).

Cardiac anxiety is operationally defined by the score on the CAQ, an 18-item self-report inventory scored on a five-point Likert scale, responses ranging from 0 (never) to 4 (always). Higher scores indicate greater cardiac anxiety (Eifert & Thompson et al., 2000).

State Anxiety (SA).

Spielberger (1972) defined state anxiety as “a transient experience of an unpleasant sensation that arouses worry and discomfort and is caused by intrinsic and extrinsic stimulation” (p. 29). State anxiety reflects a "transitory emotional state or condition of the human organism that is characterized by subjective, consciously perceived feelings of tension and apprehension, and heightened autonomic nervous system activity" (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983, p. 1).

Trait Anxiety (TA).

Trait anxiety is theoretically defined as "relatively stable individual differences in anxiety proneness as a personality trait, that is, in the tendency to perceive and respond to stressful situations with elevations in the intensity of state anxiety (S-Anxiety) reactions” (Spielberger et al., 1983, p.1). It refers to a general tendency to respond with anxiety to perceived threats in the environment (Fountoulakis et al., 2006, Spielberger et al., 1983).

State and Trait Anxiety is operationally defined by the scores on Spielberger State-Trait Anxiety Inventory (STAI) which consists of two 20-item self-report scales (Heikkila, Paunonen, Virtanen, & Laippala, 1998; Koivula, Paunonen, Tarkka, Tarkka, & Laippala, 2001). Higher scores on the self-report questionaire obtained by sum of the ratings (range 20–80 on both scales) could indicate a greater anxiety and lower score indicating less anxiety (Spielberger, Gorsuch, & Lushene, 1970; Szekely et al., 2007). The cut point used to detect both state and trait anxiety was 40.

Preprocedural Anxiety.

Similar top preoperational anxiety, preprocedural anxiety can also be described as an unpleasant state of tension or uneasiness that results from a patient's doubts or fears

(from a vast array) before an operation (Pritchard, 2009). Preprocedural anxiety characteristics mainly include four criteria: 1) presence of vague, uneasy feeling of discomfort; 2) an unknown origin of anxiety; 3) a subjective response; and 4) an objective sign (Whitley, 1992). Patients undergoing coronary angiography experience: loss of control of physical and personal self; an increased fear of the unknown; loneliness; fear of complication during and after the test; uncertainty of the outcomes that might affect their future; and insecurity due to lack of knowledge about the competency of the caregiver (Beckerman, Grossman, & Marquez, 1995).

Frailty.

Frailty is theoretically defined as "a clinical syndrome in which three or more of the following criteria are present: unintentional weight loss (10 lbs. in past year), self-reported exhaustion, weakness (grip strength), slow walking speed, and low physical activity" (Fried et al., 2001; p. 146). Fried and his colleagues (2001) refer to frailty as a wasting syndrome, with weight loss and negative energy balance as important elements (p. 146-154). It is also referred to as "physical disability, impairment in basic or instrumental activities of daily living, or simply an increased vulnerability to adverse outcomes" (Hogan, Macknight, & Bergman, 2003).

The operational definition of frailty is typically rules-based. For the purpose of this study, Frailty was operationally defined based on data from the Cardiovascular Health Study Measure as inclusion of three or more of the following: weight loss, weakness, exhaustion, low activity level, or slow gait speed (Fried et al., 2001). In this study, participants were considered frail if they had a diagnosis of congestive heart failure and five other chronic debilitating health conditions (e.g., myocardial infarction, angina,

diabetes, peripheral vascular disease, high blood pressure, cancer, chronic obstructive pulmonary disease (COPD), stroke, kidney failure/dialysis, arthritis, and any other major health conditions). Also, if participants who have had any three criteria from the following which includes fatigue or dependency on others for activities of daily living, a lot of difficulty or inability to perform activities of daily life due to health or a physical condition, and/or unintentional weight loss of more than 10 lbs. in the prior year were considered frail (Pel-Littel, Schuurmans, Emmelot-Vonk, & Verhaar, 2009; Rockwood, Fox, Stolee, Robertson, & Beattie, 1994). Patients who were deemed frail were excluded from the study.

Dementia.

Theoretically dementia is defined in DSM-IV-TR as "the development of multiple cognitive deficits that include memory impairment and at least one of the following cognitive disturbances: aphasia, apraxia, agnosia, or a disturbance in executive functioning. In addition, the cognitive impairments must be severe enough to cause impairment in social and occupational functioning and must represent a decline from a previously higher level of functioning" (APA, 2000, p. 148).

In this study, the operational definition of dementia was answering yes to a question asking if the patient was diagnosed with or had currently been treated for dementia. The participants who answered yes to the question were excluded from the study. Any participant with obvious signs of dementia before the study commenced or during questioning was eliminated.

1.5 Chapter Summary

Anxiety is an independent risk factor for CVD, however the diagnosis of CVD unconventionally provokes anxiety in patients as it is associated with life-threatening events. Therefore, when individuals get admitted to hospital for invasive cardiac procedures for diagnosis or treatment, they may experience multidimensional anxiety (CA, SA, TA) in the preprocedural unit; hospital admission for invasive cardiac procedures are stressful and produce anxiety in anticipation of related procedural complications. Higher-order conditioning of the autonomic nervous system explains the development of anxiety in the preprocedural unit when individuals are admitted for invasive cardiac procedure. However, the multidimensional anxiety theory is used to establish a linear relation between anxiety and symptom which predicts that an increase in anxiety could have a negative effect on patient's condition before and after procedure. Since anxiety in its different aspects requires different treatment, early detection of the type and level of anxiety could enable clinicians to tailor specific, individual-based treatment approaches. This study has endeavored to seek the most prevalent type of anxiety in outpatient preprocedural unit. The findings from this study can be used to increase clinicians' awareness of the predominant type of anxiety which can guide them in their decisions about appropriate treatment for anxiety and prevent pre- and postprocedural anxiety related complications.

2. BACKGROUND AND SIGNIFICANCE

2.1 Review of the Literature

This chapter reviews the relevant literature focusing mainly on CVD, anxiety, preprocedural unit anxiety, impact of anxiety on CVD and cardiac procedures, HTN and anxiety, and gender and age differences in CVD and anxiety. This literature review provides the conceptual and theoretical framework which explains the concept of anxiety and connects the multidimensional constructs (SA, TA, and CA).

2.2 What is Cardiovascular Disease

CVD is a major cause of disability and lost productivity in adults (Avendano et al., 2006). CVD is the leading cause of death in the U.S and worldwide, thus it is considered a major public health problem (Natarajan, Gafni, & Yusuf, 2005; Thom et al., 2006). By 2030, 40.5% of the U.S. population is projected to have some form of CVD (Heidenreich et al., 2011). In 2008, CVD accounted for 17.3 million deaths, and by 2030, it is projected to be 23.6 million (World Health Organization [WHO], 2011). The economic cost of CVD in the U.S. in 2006 including direct and indirect costs related to healthcare spending and loss of productivity from morbidity and mortality exceeded over $400 billion (Thom et al.). The total direct costs are projected to increase by 61%, from $273 billion to $818 billion and indirect costs from $172 to $276 billion between 2010 and 2030 (Heidenreich et al.).

In cardiology, the total number of inpatient cardiovascular operations and procedures has increased by 27%, from 5,382,000 in 1997 to 6,846,000 in 2007 (Roger et al., 2011). Each year about 4.6 million people receive emergency medical services for

symptoms indicative of CVD (Burt, 1999). Of these individuals, only one-quarter of them have true cardiac disease related symptoms, and the other three quarters of symptoms are likely noncardiac including CA or heart focused anxiety (Pope, Ruthazer, Beshansky, Griffith, & Selker, 1998).

2.3 Why Study Patients Undergoing Invasive Cardiovascular Procedures

Patients undergoing invasive cardiovascular procedures experience high levels of anxiety (SA, TA, and CA) which exemplify the complexity of psychosomatic and physiological effects that influence the outcome of the procedures and the treatment and prognosis of CVD. In cardiology, cardiac catheterization (CATH) with percutaneous intervention (PCI) and electrophysiological (EP) studies are the gold standard invasive procedures used for CVD diagnosis and treatment including life threatening coronary artery disease and cardiac arrhythmias (Bosen & Flemming, 2003; Caldwell, Arthur, Natarajan, & Anand, 2007; DeJong & Morton, 1997; Natarajan et al., 2005). Hospital admissions for these invasive cardiac procedures are stressful and produce anxiety in many patients (Beckerman et al., 1995; Davis et al., 1994). Furthermore, those with progressive CVD experience high degrees of anxiety before and after every cardiac procedure (Gulanick, Bliley, Perino, & Keough, 1998; Heikkila et al., 1998; Ryan, 1975; Trotter, Gallagher, & Donoghue, 2010), although they are unlikely to have a clinical diagnosis of general anxiety disorder. However, little consideration has been given to the diagnosis and treatment of this problem. Studies have reported that healthy psychological functioning or emotional vitality (sense of energy, positive well-being, and effective emotional regulation) reduce risk and the threat of cardiovascular events (Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004; Giltay, Kamphuis, Kalmijn,

Zitman, & Kromhout, 2006; Kubzansky, Sparrow, Vokonas, & Kawachi, 2001; Kubzansky & Thurston, 2007). This effect is induced by the lowering of the heart rate, low blood cortisol level, low blood pressure, and attenuated fibrinogen stress response (Steptoe & Wardle, 2005; Steptoe, Wardle, & Marmot, 2005b). Thus, it is important to study the effect of anxiety, especially CA, on cardiovascular outcomes.

2.4 Impact of Anxiety on CVD and Cardiac Procedures

Anxiety is an independent risk factor of CVD, and it is associated with increased cardiac morbidity and mortality (Levenson, 2006; McCann, Fauerbach, & Thombs, 2005; Sheps & Sheffield, 2001). The prevalence of anxiety disorders in cardiology clinics ranges between 25% and 35% (Eifert, Zvolensky, & Lejuez, 2000; Fleet & Beitman, 1998). Individuals with cardiac diseases or cardiac symptoms experience elevated health related anxiety (Aikens, Michael, Levin, & Lowry, 1999) which increases sympathetic nervous system response, resulting in an increase in heart rate, respiratory rate, and blood pressure. Studies have reported that patients who exhibit these physiological symptom variations, especially heart rate variation due to high levels of anxiety, have a 4.5 – 6.0 fold increase in risk for sudden cardiac death (Albert et al., 2005; Kawachi, Sparrow, Vokonas, & Weiss, 1994; Kawachi, Sparrow, Vokonas, & Weiss, 1995; Watkins, Grossman, Krishnan, & Sherwood, 1998). High levels of stress and anxiety also leave men at a 50% higher risk of sustaining myocardial infarction (Rosengren, Tibblin, & Wilhelmsen, 1991). Williams and colleagues (2013) reported in a recent study that high level of anxiety in patients anticipating cardiac procedures is a strong and independent predictor of mortality and morbidity. Preoperative high level of anxiety is also associated

with increased discharge to a healthcare facility like a nursing home, convalescence, or rehabilitation facility.

Cardiac preprocedural unit anxiety may increase a patient's feelings of uneasiness in the unfamiliar surroundings (Dirik & Karanci, 2003). High level of anxiety over sensitize the patient to unpleasant stimuli which heighten their senses of touch, smell, or hearing resulting in intense pain, dizziness, and nausea. These preprocedural physiological and psychological responses to the stressors increase the duration of invasive procedures, need for sedatives, analgesics, and anesthetic requirements (Nilsson, Lindell, Eriksson, & Kellerth, 2009). Patients also experience intensified postoperative pain and may even have a prolonged hospital stay (Agarwal et al., 2005). Studies have revealed that patients with high preprocedural anxiety before surgical cardiac procedures, such as coronary artery bypass surgery and valve surgery, had increased postoperative complications (Stengrevics, Sirois, Schwartz, Friedman, & Domar, 1996), increased hospitalizations for cardiac symptoms (Szekely et al., 2007), increased mortality risk (Tully et al., 2011), and increased chest pain and poorer outcomes (Gallagher et al., 2010). On the contrary, patients with low levels of anxiety had fewer complications postprocedure and had better quality of life postoperatively (Tung, Hunter, Wei, & Chang, 2009). Studies have also found that despite detailed explanation during the informed consent process, before any invasive cardiac procedure, patients have their own concerns related to the risks associated with the procedure and their own perception of risk and anticipation of diagnostic confirmation and its related complications (Heikkila et al., 1998), which may even lead to cancellation of the procedure (Caldwell et al., 2007).

2.5 Anxiety in Preprocedural Unit: State, Trait, and Cardiac Anxiety

Anxiety disorder (AD) is the most common psychiatric illness in the U.S affecting 40 million adults, ages 18 and older (Anxiety Disorder Association of America [ADAA], 2010-2011); Kubzansky, Kawachi, Weiss, & Sparrow, 1998). In 2003, AD was found to be the second leading cause of the burden of disease after ischemic heart disease (Smith, 2007). It impose great personal, economic and societal burden (Alexander et a., 2007; Katzman, 2009; Ninan, 2001). AD costs more than $42 billion a year, almost a third of the country's $148 billion total mental health bill (ADAA, 2010-2011); Greenberg et al., 1999). Over half of the total $42 billion is associated with the repeated use of health care services (ADAA, 2010-2011) especially by patients whose anxiety symptoms mimic physical illnesses (Baldwin, Ajel, & Garner, 2008). Studies have shown that AD is often associated with other psychiatric illness such as major depressive disorder, psychosis, mania, and substance abuse disorder and non-psychiatric disorders such as hyperthyroidism, Cushing's disease and mitral value prolapse (Alexander et al., 2007; Katzman, 2009; Ninan, 2001).

In individuals hospitalized for elective invasive CATH and EP procedures, preprocedural anxiety is elicited in anticipation of real or imagined future events, loss of control, fear of discomfort, uncertainty, fear about survival, or suffering from some life threatening heart disease (cardiophobia) (Trotter et al., 2010; White, 2008). Findings from qualitative studies report that preprocedural concerns are more distressing than chest pain requiring urgent hospitalization (Frasure-Smith et al., 1995; Grunberg et al., 2003; Higgins, Dunn, & Theobald, 2000; Lunden, Bengston, & Lundgren, 2006). Anxiety in these patients has two closely related dimensions: 1) state, a transient

experience; and 2) trait, an enduring and predictable behavioral response (Spielberger et al., 1983; Uzun, Vural, Uzun, & Yokusoglu, 2008).

State anxiety (SA) is "a transient experience of an unpleasant sensation that arouses worry and discomfort and is caused by intrinsic and extrinsic stimulation" (Spielberger, 1972, p. 29). SA in these patients is likely due to discomfort, unfamiliarity with strange environments, uncertainty about the findings of the procedure, potential influence of the cardiac diagnosis and illness on their occupations, personal lives, relationships with others, and fear of death (Higgins et al., 2000; Higgins, Dunn, & Theobald, 2001; White & Frasure-Smith, 1995).

Trait anxiety (TA) refers to "relatively stable individual differences in anxiety proneness, that is, the tendency to perceive and respond to stressful situations with elevations in the intensity of state anxiety reactions" (Spielberger et al, 1983, p.1). Since a patient with a stronger anxiety trait could experience intense levels of SA (Spielberger, 1983), patients in preprocedural unit who have TA could experience high level of SA from the anticipation of real or imagined future events, loss of control, fear of discomfort, uncertainty, fear about survival, or suffering from some life threatening heart disease or cardiophobia (White, 2008). These preprocedural concerns have been reported by many qualitative studies to be more distressing than chest pain requiring urgent hospitalization (Higgins et al., 2000; Frasure-Smith et al., 1995; Grunberg et al., 2003; Lunden et al., 2006).

Individuals waiting for cardiac procedures in preprocedural units may also experience high levels of cardiac anxiety (CA) which is exclusively associated with the fear of cardiac-related stimuli and sensations based upon their perceived negative

consequences (Eifert, Thompson, & et al., 2000; see Figure 5). Patients with CA experience distress because of the belief that cardiac disease related symptoms, especially chest pain, are indicative of a pathological cardiac functioning (Aikens, Michael, Levin, & Lowry, 1999; Carter et al., 1992; Krantz & McCeney, 2002). The anxiety characteristics persist for years or even decades, and relatively few remit spontaneously or without treatment (U.S. Department of Health and Human Services [USDHHS], 1999). These individuals are attentive to cardiac-congruent sensations due to the public perception that cardiac related symptoms are dangerous (Eifert, Zvolensky, et al. 2000). However, Cox (1996) identified that these specific salient fears cue trigger anxiety in individuals with and without heart disease. Exclusively in preprocedural unit, the anticipation of diagnostic confirmation of cardiac disease and its related complications that disrupt personal, family, and social life, of making life style changes, and the associated heart related complications and life threatening events could elicit negative physiological changes requiring urgent intervention.

In both cardiac and noncardiac patients, CA is the key factor in producing cardiopulmonary and psychological distress, which is associated with a number of clinical and medical syndromes (Eifert, 1992; Eifert, Hodson, Tracy, Seville, & Gunawardane, 1996). Although CA is not related to bodily sensations, it is specific to cardiac related events and events perceived to be related to cardiac causes. CA is clinically relevant as symptoms of CA predict quality of life. That is, high levels of CA adversely influence recovery and adherence to suggested behavior and lifestyle changes that are intended to reduce coronary risk (Emery, Frid, Glazer & Banyasz, 2002; Zigelstein et al., 2000), participation in cardiac rehabilitation (Glazer, Emery, Frid, &

Banyasz, 2002), and return to employment (Soderman, Lisspers, & Sundin, 2003). And finally, CA increases cardiac mortality and morbidity (Frasure-Smith et al., 1995; Krantz & McCeney, 2002). Since CA is more specific than other psychological factors linked to development and maintenance of anxiety problems, it can be defined as a subset of anxiety sensitivity, which is described as fear of anxiety related symptoms in general, based on the belief that they have harmful consequences (Reiss & McNally, 1985). Certainly in patients with CA, the fears and worries about dying and/or having a heart attack induce worry or fear about chest pain symptoms. As a result, these individuals anxiously monitor their heart and pulse, avoid activities that bring on the symptoms, and repeatedly seek reassurance from healthcare providers (Eifert, Thompson, & et al., 2000).

Preprocedural anxiety (SA, TA, or CA or combinations of these) in those individuals who are awaiting cardiac procedure may cluster around adaptive and maladaptive presentations. An adaptive response to anxiety may aid in the preparation for procedure; however, a negative or maladaptive response can cause harm (Pritchard, 2009).

In cardiology, CA is often misdiagnosed or unrecognized as a primary problem that contributes to the presenting symptoms (Fleet & Beitman, 1998). As is widely known, CA is predictive of disability due to its persistent nature, as persistent anxiety increases physical signs and symptoms and deteriorates functional status (Sullivan, LaCroix, Baum, & Grothaus, 1997; Sullivan, LaCroix, Spertus, & Hecht, 2000). Studies have shown that in patients with CVD, anxiety, particularly CA, provoke and intensify the severity and frequency of chest pain and may likely increase the probability of cardiovascular death (Fleet & Beitman, 1998; Mendels, Chernoff, & Blatt, 1986).

However, in patients without CVD, CA can result in costly doctor visits and medical examinations followed by renewed anxiety and worry (Aikens, Wagner, & Saelinger, 1999).

2.6 The Clinician's Conundrum: Which Type of Anxiety Is It?

CA, SA, and TA contain psychological elements common to the categories of AD classified by Diagnostic and Statistical Manual of Mental Disorders-IV-Text Revision (DSM-IV-TR), such as hypochondriasis, panic disorder, specific phobias, and adjustment disorders (APA, 2000; Eifert, Zvolensky & et al., 2000). CA and TA share characteristics of hypochondriasis and panic disorders characterized by prevalent health anxiety, illness beliefs (Hiller, Liebbrant, Rief, & Fitcher, 2005), recurrent unexpected panic attacks, and development of either a persistent fear of having future panic attacks, persistent worry about the implications of the attack or consequences, or significant changes in behavior related to the attacks (APA, 2000; Eifert, Zvolensky, & et al., 2000). Furthermore, the key feature of CA is similar to that of hypochondriasis, an abnormal concern that one is developing or has a serious illness based on misinterpretation of bodily symptoms; furthermore, the person is preoccupied with health concerns for at least six months despite appropriate medical evaluation and reassurance (Eifert, Zvolensky, & et al., 2000). The clinical presentation of CA is more similar to hypochondriasis than panic disorder because of its distinguishable clinical condition characterized by more psychopathology, distress, and increased healthcare utilization (Hiller et al. 2005). However, CA is analogous to panic attack as in both there is a discrete period of intense fear or discomfort characterized by a display of various cardiopulmonary symptoms (APA, 2000).

The features of CA and SA also concur with those of a specific phobia with "marked and persistent fear that is excessive or unreasonable cued by the presence or anticipation of a specific object or situation" (APA, 2000, p. 449). CA and SA are similar to the two subtypes of specific phobias; CA is the specific fear phobia that relates to the fear of an explicit cause, and SA is the situational type of phobia that includes fear of situations. SA and TA are nonpathological forms of transient anxiety which, along with the inherent nature of TA, manifests the characteristics of panic disorder (Arnold, Zai, & Richter, 2004; Gross & Hen, 2004; Kendler, Aggen, Jacobson, & Neale, 2003; Lau, Eley, & Stevenson, 2006; National Institute of Mental Health Genetics Workgroup [NIMHGW], 1998). However, when a nonpathological transient anxiety (SA, TA) perpetuates itself over the long-term, it changes to persistent anxiety (CA) and becomes abnormally severe (Salkovskis, Warwick, & Deale, 2003). Severe persistent pathological anxieties such as TA and CA are clinically important, because they are associated with impairment of physical, psychological, and hemodynamic functioning. Persistent anxiety characteristics in TA and CA are manifested by symptoms of motor tension, autonomic hyperactivity, apprehension, and hyper-attentiveness (APA, 2000). These pathological forms of persistent anxiety severely interfere with normal life (Gross & Hen, 2004), are predictive of disability (Sullivan et al., 1997; Sullivan et al., 2000), hinder adjustment to the disease condition and recovery after an acute event, increase risk for more cardiac events, and in patients with CVD, they either delay or prevent returning to work (Benninghoven et al., 2006, Moser, 2007).

Table 1

Psychological Elements in Cardiac Anxiety, State Anxiety, and Trait Anxiety are Similar to Anxiety Disorder Classified by DSM-IV-TR

Characteristics of CA	Characteristics of SA	Characteristics of TA
Persistent, pathological Becomes abnormally severe	Transient, nonpathological	Transient, nonpathological Inherent
Hypochondriasis & Panic Disorder • Prevalent health anxiety and Illness belief • Misinterpretation of bodily symptoms • Recurrent unexpected panic attacks- discrete intense fear manifested as cardiopulmonary symptoms • Persistent fear of future panic attacks • Persistent worry about the implications of the attack or consequences, or significant changes in behavior related to the attacks **Key Feature of Hypochondriasis** • Abnormal concern • Preoccupied with health concerns for at least six months • More psychopathology and distress • Increased healthcare utilization • Discrete period of intense fear or discomfort-similar to panic attack • Pathological/becomes abnormally severe • Increased healthcare use		**Hypochondriasis & Panic Disorder** • Prevalent health anxiety and Illness belief • Misinterpretation of bodily symptoms • Recurrent unexpected panic attacks- discrete intense fear manifested as cardiopulmonary symptoms • Persistent fear of future panic attacks • Persistent worry about the implications of the attack or consequences, or significant changes in behavior related to the attacks • Nonpathological & Inherent as panic disorder
Specific Phobia • Excessive or unreasonable persistent fear • Fear of an explicit cause	**Specific Phobia** • Excessive or unreasonable fear • Fear of situations	*Nonpathological transient anxiety (SA, TA) perpetuates itself over the long-term and changes to pathological persistent anxiety*

Note. Created by Shajimon, B. 2012 from - APA, 2000; Eifert, Zvolensky, & Lejuez, 2000; Hiller et al., 2005.

In the cardiac preprocedural unit, the thought of the negative consequence involved with the particular procedure or heart disease conviction following the procedure contributes to development of a specific fear. Whereas, the individual's beliefs and interpretations about feared situations lead to the development of preprocedural SA, and those beliefs related to cardiac specific life threatening disease conviction lead to CA. In the preprocedural unit, patients with TA could experience a high level of SA and perhaps CA also. When referring to a specific phobia, especially in preprocedural, a patient with CA experiences feelings of anxiety, fear, or panic immediately upon encountering the feared situation. The person avoids the feared object or situation or encounters the situation with intense anxiety causing significant distress. This excessive or unreasonable anxiety interferes with physiological changes in the preprocedural unit and their day-to-day life, yet these symptoms are not recognized or diagnosed as specific phobia for at least six months especially in individuals under age 18 years and they are not accounted for as a mental disorder (APA, 2000; Eifert, Zvolensky, & Lejuez, 2000). Similar to the diagnosis of other medical disorders, the diagnosis of AD can be approached in a systematic way and can result in an appropriate intervention. Since high levels of anxiety are potentially amendable, identifying these patients in preprocedural units or cardiology clinics would provide an opportunity to increase psychological well-being, decrease risk, and improve the clinical outcome.

2.7 Are There Gender and Age Differences in CVD and Anxiety

CVD is the single leading cause of death for both men and women (Center for Disease Control and Prevention [CDC], 2010). There are significant differences in gender and age for those with CVD (Ho, Paultre, & Mosca, 2005). An estimated

82,600,000 American adults (39.9 million men; 42.7 million women) or greater than 1 in 3 have one or more types of CVD. Almost half of them are estimated to be 60 years of age and older (Roger et al., 2011). However, there are also differences in the ages of both men and women at which CVD is diagnosed. In men, symptoms of CVD usually appear early in their fifties, whereas in women similar symptoms often do not show until they are in their sixties when they are often complicated by other health problems, such as diabetes, making effective treatment more difficult (Olsen, 2011; WHO, 2009). In women, late onset of CVD symptoms to some extent is due to the estrogen protection in early life (Jousilahti, Vartiainen, Tuomilehto, & Puska, 1999). As a result, CVD events occur 10 years later in life in women compared to men causing a higher mortality rate from CVD among women than in men (Roger et al., 2011). Since 1984, in the U.S., the number of CVD deaths for women has exceeded those for men. Ever since, the burden of heart disease on women and the global economy continues to increase (Yusuf, Reddy, Ounpuu, & Anand, 2001). In 2007, CVD accounted for 51.8% deaths in women and 48.2% death in men (Roger et al., 2011). Despite a high prevalence of CVD in women, disparity in screening, diagnosis, and treatment for CVD exists, which probably contributes towards increased heart related anxiety in women (Ayanian & Epstein, 1991).

In addition to gender differences, age also differs significantly in the prevalence of CVD. According to 2007 statistics, those aged 65 and older had the highest rate of CVD. It was also reported that the average annual rate of first cardiovascular event rise with increasing age *from* 3 per 1000 men at 35 *to* 44 years of age to 74 per 1000 men at 85 to 94 years of age (Roger et al., 2011). The gap narrows with advancing age. The American Heart Association reported in 2007 that more than 150,000 Americans died as

a result of CVD were less than 65 years of age; nearly 33% who died were less than 75 years of age, which is before the average life expectancy of 77.9 years (Roger et al., 2011). Since women are at high risk of having heart attacks at older ages than men, the death rate due to myocardial infarction is higher in women than in men (American Heart Association, 2007; Roger et al., 2011). It was also found that approximately 26% of women aged 45 years of age or older die within a year compared to only 19% of men after an initially recognized myocardial infarction (Roger et al., 2011).

Anxiety disorder, specifically panic disorder, is the most common mental health problem affecting about 6 million American adults (Kessler, Chiu, Demler, & Walters, 2005). It is twice as common in women as in men (Alexander, Dennerstein, Kotz, & Richardson, 2007; Katzman, 2009; Robins & Regier, 1999). In AD an overall female to male ratio of 2:1 is seen across the age range of 18-65 (Smith, 2007; Wittchen & Jacobi, 2005). Younger women have a higher prevalence of AD than younger men, and this difference diminishes with increasing age (Krasucki, Howard, & Mann, 1998). Salzman's (1991) study found that AD is less prevalent in later life than in young adult life. Similar results have been found in the data from a normative sample of working adults. This data suggested that men and women over age of 50, especially women, have lower levels of SA and TA than younger men and women, and the youngest group of women have substantially higher anxiety than any other group (Spielberger et al., 1983). Lau and colleagues (2006) found that women have high levels of TA.

Anxiety is a major problem for younger patients (Krasucki et al., 1998). It is also a common problem for older patients because of the presence of comorbid chronic illness such as HTN, depression, COPD, irritable bowel syndrome, or diabetes (Smith, 2007).

However, when compared to gender differences, result of the studies done by Gallagher and colleagues (2010) and Heikkila and colleagues (1998) have demonstrated that women (especially with CVD) compared to men experience more psychological stress that produces anxiety related to the fear of the outcome of the CATH procedure (p = .0001), possible bypass surgery (p < .0001), pain (p = .004), job strain, vital exhaustion, social isolation, lack of social support (p = .009), potential sexual difficulties, hostility and anger, anxiety and depression, diagnosis of CVD, and some fear of death (p = .041; Gallagher et al., 2010; Heikkila et al., 1998). Furthermore, since women have an increased anxiety, from the fear of pain, their chest pain symptoms often continued after CATH procedures (Heikkila, Paunonen, Virtanen, & Laippala, 1999).

2.8 Hypertension and Anxiety

HTN is a biological mediator in the causal pathway of coronary heart disease (Albert et al., 2005). Patients with HTN are at increased risk for CVD (Gerund, Aiken, West, & Erchull, 2004). Studies have reported that individuals with a diagnosis of HTN consider high blood pressure as to be a serious medical condition and perceive themselves as being sick (Melamed, Froom, & Green, 1997; Spruill et al., 2007). Their response to this health threat has a significant effect on their emotional state which influences physiological regulation and psychological dysfunction ((Rostrup & Ekeberg, 1992). A large study done in South Africa (N =4351) provided evidence of an association between HTN and anxiety disorders (Grimsrud, Stein, Seedat, Couldiams, & Myer 2009). It is also reported that anxiety levels in middle aged men and women are predictive of the incidence of HTN (Jonas, Franks, & Ingram, 1997; Markowitz, Matthews, Kannel, Cobb, & D'Agostino, 1993). HTN diagnosis along with another

chronic physical condition was associated with 12 months of anxiety disorders (Grimsrud et al., 2009). In addition, a study by Jhalani and colleagues (2005) provided empirical support that anxiety and blood pressure expectancy elevate clinical blood pressure, which may be associated with cardiovascular disease and future cardiac events.

HTN status, which has either been diagnosed or labeled HTN, has a significant effect on SA during a clinical visit independent of true hypertensive status. The patients were found to have higher level of SA in a clinical setting compared to those who were unaware or had never been diagnosed with HTN according to the results of the study done by Rostrup and Ekeberg (1992) and Spruill et al., (2007). A prospective study by Albert and colleagues (2005) reported that patients without baseline CVD, but who have the factors like HTN, experience a high level of phobic anxiety that increased their risk for sudden cardiac death and fatal coronary heart disease. However, anxiety was found not only to affect the myocardium, but also led to HTN, as the chronically increased catecholamine levels associated with anxiety has been shown to elevate blood pressure (Jonas et al., 1997). Studies have indicated that individuals with anxiety disorder have a higher incidence of HTN, and evidence indicated that TA was a predictor of a subsequent rise in blood pressure (Jenkins, Sooervell, & Hames, 1983; Markowitz, Matthews, Wing, Kuller, & Meilahn, 1991; Pernini, Muller, & Buhler, 1991). Studies have also suggested that anxiety levels in middle aged men and women are predictive of the incidence of HTN (Markowitz et al., 1993; Jonas et al., 1997).

2.9 Conceptual and Theoretical Framework

Anxiety is a detrimental emotion that arises in response to perceived threats, from either internal or external source, which can be real or imagined. Anxiety characteristics

include inability to predict, control, or gain desired results (Moser, 2007). Anxiety becomes inappropriate when it increases or persists to a level that could result in medical or psychological consequences and influence an individual's everyday life (Whitley, 1992).

Patients undergoing cardiac procedures experience mental conflict that give rise to anxiety that includes the feeling of helplessness, loss of control of the situation, uncertainty of procedure and future, anticipation of the risk and outcomes of the cardiac procedure, threat of CVD and death, having to make treatment choice for CVD, living with CVD, functional ability, quality of life, and influence on social life. An increased level of anxiety is found to have a negative effect on hemodynamics, performance, and quality of life which is explicitly explained using Multidimensional anxiety theory (MAT; see Figure 4). This theory established a linear relation between anxiety and symptoms (Mackenzie, 2010). Using MAT, we can predict that an anxiety in patients with CVD would increase the sympathetic nervous system response which would escalate anxiety symptoms that would affect the physical, emotional, and psychological wellbeing of the person (Mackenzie, 2010; Morris, Davis, & Hutchings, 1981). These theories are discussed in detail in chapter five.

2.10 Chapter Summary

Despite advancement in technology, CVD remains the leading cause of death and disability in adults worldwide. Since CVD is associated with high morbidity and mortality, the invasive cardiac procedures used for diagnosis of this life-threatening disease provoke anxiety (CA, SA, and TA) in patients. In the preprocedural unit, where patients are waiting for invasive cardiac procedure, SA is due to the interaction between

disposition and a stressor, and CA results from the interplay of genetic vulnerability to anxiety symptoms and the cardiac focused environment. On the other hand, TA is a genetically mediated disposition toward anxiety. Therefore, TA is manifested as SA under threatening circumstances and CA due to cardiac related symptoms, cardiac disease conviction, fear of CVD, and related mortality and morbidity. The possible preprocedural anxiety (CA, SA, or TA) experienced by an individual is a multidimensional construct that can be transient or persistent in nature.

The purpose of the study is to determine the difference in CA, SA, and TA in male and female patients admitted for invasive cardiac procedures in a hospital-based, preprocedural unit so that the specific anxiety can be identified and properly treated and managed. Persistent CA affects the patient physiologically and psychologically which prolongs hospital stay, increase procedural duration, increase anesthetic requirements, and increase postoperative pain. Unlike transient anxiety (such as SA, TA, and panic disorder), persistent anxiety (such as CA, hypochondriasis) needs structured long-term behavioral therapy and medications. Young women compared to young men suffer more from persistent anxiety. These individuals need to be diagnosed earlier in life regardless of their medical status to tailor appropriate treatment. Early diagnosis would help them cope with the disease, decrease complications, improve prognosis and quality of life, decreases their level of functional impairment, increase their quality of life, and reduce health care costs. Therefore, the nursing profession needs to take the initiative to identify people's psychological needs and provide appropriate care in collaboration with the medical team. It is important to heighten awareness among nurse clinicians and scholars to fill the gap in current knowledge in this population so that individuals with CA, SA,

and TA can have a better quality of life which in turn can have positive individual and societal implications.

3. RESEARCH DESIGN AND METHODS

This chapter describes the research design and methods used in the study. The methods descriptions include the process of sample selection and sample size estimation, a description on the instruments used, the protection of human subjects, risk and benefits, inclusion of women and minority subjects, inclusion of children, data and safety monitoring plan, procedure, compensation to subjects, benefit to society, vertebrate animals, timeline for the project, and the statistical methods used for data analysis.

3.1 Research Design

A cross-sectional descriptive design was used to examine the differences in CA, SA, and TA in patients admitted for an invasive cardiac procedure in an outpatient preprocedural unit (see Figure 1).

Figure 1: Research Design

3.2 Sample and Subject Recruitment

A convenience sample of 92 patients who met the inclusion criteria were recruited from 113 consecutive patients admitted in an outpatient preprocedural unit for invasive cardiac procedure in a large urban university hospital. The reason to recruit subjects from a large urban university hospital was to represent the target population adequately, and the reason to sample patients consecutively was to provide equal probability of selection to each patient. Potential subjects were selected based on the following criteria.

1. The potential subject was at least 30 years of age.
2. The potential subject was scheduled for an elective invasive cardiac procedure.
3. The potential subject was able to give informed consent.
4. The potential subject was fluent in the English language.
5. The potential subject was enrolled in the study for at least 1 hour before the procedure was scheduled.

The subjects were excluded from the sample based on the following criteria.

1. The subject required emergency cardiac procedures.
2. The subject did not speak or understand English.
3. The subject was deemed as demented or frail.
4. The subject was 89 years or older.

3.3 Sample Size Estimation

A power analysis was conducted to determine the sample size necessary to test the hypotheses and thus minimize a Type II error. The primary hypothesis was that there is a significant difference in CA scores using the CAQ-R survey by gender for patients undergoing elective cardiac procedures in an outpatient preprocedural unit. It was hypothesized that CA scores in women would be significantly higher than those of men for this population. Based on published studies in similar patient populations, the expected mean CAQ score for female patients was 1.3 with a standard deviation of 0.8 and male patients was 0.8 with a standard deviation of 0.8 (Van den Broek, Nyklicek & Denollet, 2009). An expected 60% of the sample was expected to be men and 40% would be women. A sample of 48 male patients and 32 female patients were needed in order to achieve 80% power to detect a difference of 0.5 in the mean CAQ-R score

between female and male patients with a standard deviation of 0.8 (effect size of 0.63). The significance level was set at 5% using a two-sided *t*-test. For a significance level of alpha 0.05 and to achieve a power of 0.80, a minimum sample of 80 subjects would be required. An institutional review board approval was obtained for 125 to obtain the minimum number of 80.

3.4 Instrumentation

Three instruments were used for the measurement of study variables. These were: 1) The Cardiac Anxiety Questionnaire-Revised (CAQ-R); 2) The Spielberger State-Trait Scale Form–Y (STAI-Y); and 3) Demographic Data Form.

The Cardiac Anxiety Questionnaire-Revised (CAQ-R).

The Cardiac Anxiety Questionnaire (CAQ) is designed to measure heart-focused anxiety or CA. The revised version of this is CAQ-R (Eifert, Thompson, & et al., 2000; see Appendix B)**,** which was used to measure the level of CA prior to cardiac procedures. The CAQ-R is an 18-item self-report inventory scored on a five-point Likert scale; responses range from 0 (never) to 4 (always). Higher scores indicate greater CA (Eifert, Zvolensky, & et al., 2000). Eifert, Thompson, and colleagues (2000) evaluated the CAQ in a sample of 188 participants undergoing outpatient coronary angiography. It had been shown to be successful when used as a screening measure in clinical research Aikens, Michael, Levin, & Lowry, 1999; Van Etten, Abelson, Lowell, Schwartz, & Briggs, 1999) and as a cognitive behavioral therapy outcome measure with the medical population (Eifert, Zvolensky et al., 2000; Eifert & Lau, 2001; Esler et al., 1999; Van Etten et al., 1999). CAQ is composed of four subscales: 1) worry and fear (heart focused worry and fear), 2) avoidance behavior (avoidance of strenuous activities believed to elicit cardiac

symptoms –"cardioprotective behavior"), 3) attention (heart-focused attention and monitoring), and 4) safety seeking (safety and reassurance seeking behavior; Eifert, 1992; Marker, Carmin, & Ownby, 2008). The CAQ-R yields a total score for each subscale and an average item score for each factor by calculating a sumscore across items and dividing by the number of items endorsed for each factor. Furthermore, a total average score is calculated by summing across all items and dividing by 18. Reliability analysis revealed good internal consistency of the total (Cronbach's alphas of 0.87) and four subscale scores (Cronbach's alphas of 0.81, 0.81, 0.69, and 0.70 respectively); item-scale correlations range between 0.30 and 0.77. Inter-scale correlations range from 0.19 (attention/safety) to 0.51 (worry/safety; Eifert, Thompson, & et al., 2000). CAQ has also demonstrated a good convergent validity when correlated with the Anxiety Sensitivity index (Reiss, Peterson, Gursky, & McNally, 1986). Factorial invariance across groups was assessed, which showed that the factor structure of the CAQ did not differ in individuals with or without clear evidence of coronary disease.

The Spielberger State-Trait Anxiety Inventory Form–Y (STAI-Y).

The Spielberger State-Trait Anxiety Inventory (STAI) is a definitive self-report assessment instrument designed to measure and to differentiate between anxiety as a state and as a trait (Spielberger et al., 1970). The newer version STAI Form-Y (Spielberger, 1983; see Appendix B) was used to measure the level of state-trait anxiety prior to cardiac procedures. The STAI-Y state and trait scale has 20 items each describing how people generally feel, rated on a four-point frequency scale from almost never to almost always. The median alpha coefficient for Form-Y is 0.90 and 0.93, and test-retest coefficients range from 0.73 to 0.86 and 0.16 to 0.62 for scores on the TA and SA scales

respectively (Spielberger, 1983). The STAI-Y has been used extensively, and construct validity, concurrent validity, and test-retest reliability have been established as adequate by using scores for medical and surgical patients, dental patients, high school and college students, military personnel, and psychiatric patients (Astin, Jones, & Thompson, 2005). Several studies have revealed adequate internal consistency and convergent validity in older adult population (Himmelfarb & Murrell, 1983; Iwata et al., 2000; Kabacoff., Segal, Hersen, & Hasselt, 1997; Kvaal, Laake, & Engedal, 2001; Kvaal, Ulstein, Nordhus, & Engedal, 2005; McDonald & Spielberger, 1983; Stanley, Novy, Bourland, Beck, & Averill, 2001; Suzuki, Tsukamoto, & Abe, 2000). In the SA scale of STAI, the total score is the weighted sum of the 20 responses and ranges from 20 to 80: low anxiety (20-39), moderate anxiety (40-59), and high anxiety (60-80) (Speilberger, et al., 1983).

Demographic data form.

The demographic data form, prepared by the investigator, was used to generate information on general demographic features. These included questions about, for example, gender, age, income, and education. The complete demographic questionnaire can be found in Appendix B.

3.5 Protection of Human Subjects

Individuals with CVD who were 30 or older were not considered a vulnerable population for this study. However, measures were taken to ensure protection of human subjects. The first step was allowing voluntary participation and assuring confidentiality. Initially the principal investigator (PI) or the research assistant (RA) approached the patients admitted for outpatient invasive cardiac procedures at Hahnemann University Hospital in Pennsylvania and invited them to participate in the study. The patients were

assured that their participation was voluntary and that they could withdraw at any time without any consequences. Confidentiality was guaranteed and potential subjects were selected based on the study's inclusion and exclusion criteria. A brief explanation of the purpose, protocol, risks, and benefits of the study were given to the patient. After giving an opportunity to ask questions and accurately verbally state the purpose of the study and the expectations from the participants of the study, they were asked to complete the questionnaire provided. All communications were conducted in the privacy of the patient's examination room with access to healthcare staff responsible for the person's care and assurance of HIPAA compliance.

No personal identifiers were connected with the data. Instead of using the name of the study participant, a code number was assigned, as an identifier, to all the information received. The investigator linked the code number of the data received from the patient while logging the information. The PI managed all information obtained and/or identifying records. A hardbound copy was secured in a locked, password-protected computer and file cabinet in the researcher's home and could be kept for a minimum of seven years, with access only to the research team. Electronic data was stored on computer in PI's locked office. Data was protected by password and security systems including network firewall technologies to prevent unauthorized external access to data repositories. This process protects the participants' rights to privacy and confidentiality.

Data was collected and analyzed exclusively for this study. All data collected and analyzed were used specifically for research purposes and was protected from disclosure outside the research team, thus minimizing the risk for individual participants. An

institutional review board approval was obtained from Drexel University to protect the subjects in the study.

3.6 Risk and Benefits

There was a mild to moderate risk of psychological and physical stress involved in this study. The involved risk was that the participants may become anxious or fearful while answering the questionnaire. They may also experience fatigue during the process. If these experiences happened, the participants decided whether to terminate answering the questionnaire at any time to rest or to choose not to continue in the study. To minimize the risks/harm, detailed information on the nature of the study and the participant's involvement was discussed. Before the study actually began, the participants were made aware of the possible risk and their ability to withdraw from the study at any point without any consequence. Any untoward or unforeseen risk would have been reported immediately to the Office of Research Compliance at Drexel University and the supervising professor. However, there was no risk incurred in this study. In case of any acquired risk, appropriate treatment within the limits of that normally offered by the Hahnemann preprocedural unit was arranged to be provided. If the person required care beyond the capabilities of the unit, then the participant was referred to other resources such as a hospital emergency room or a mental health clinic. No other medical treatment or financial compensation for injury from participation in this project was available. Participants were responsible for any expenses incurred by referral required for management of untoward events during this study.

3.7 Inclusion of Women and Minority Subjects

Both female and male participants of any racial or ethnic background who met the study's inclusion criteria and who did not present with any of the exclusion criteria were eligible to participate in the study. Since it was a consecutive sample, an equal number of female and male subjects were not obtained.

3.8 Inclusion of Children

No children were recruited for the study, as children were not included in the population of interest.

3.9 Data and Safety Monitoring Plan

This study did not implement any phase I, II, or III clinical trials, thus a formal data and safety monitoring plan was not proposed. However, patients were admitted for invasive cardiac procedures by a cardiologist. Thus all study participants were under the care of the cardiologist, and the name of the cardiologist was requested or confirmed at the time of data collection.

3.10 Procedures

The PI or the RA approached each patient, while he or she was waiting for invasive cardiac procedures in an outpatient, preprocedural unit and invited the patient to participate in the study. The PI/RA then briefly explained the purpose of the study and screened patients for eligibility. Screening for dementia and frailty was done through verbal verification (see Appendix B). Patients who were found to have dementia or frailty were excluded from the study. Eligible patients who met the inclusion criteria and were willing to participate in the study were asked to complete the questionnaires and the sample selection was stratified by gender. All participants completed the CAQ-R,

Spielberger STAI Form-Y, and the demographic form and returned it in a sealed envelope to the PI/RA.

Most participants were able to complete the questionnaires without assistance. To minimize environmental factors, the participants were provided a quiet environment. Participants took approximately 15-20 minutes to complete the questionnaires. All the patients completed the questionnaire on the day of their coronary angiography or EP study. Incomplete questionnaires were not included in the study. The PI/RA did not collect any of the patient's identifiable information.

3.11 Compensation to Subjects

No compensation was provided to the study participants. Study participants could request the results of the study by contacting the PI as listed on the consent form.

3.12 Benefit to Society

The anticipated benefit to the society is that the results from the study could be used to expand on the literature and knowledge of psychological experiences in cardiac preprocedural unit and to understand the factors that link to a better outcome. The findings could also help physicians recognize and treat the psychological stressors of the targeted patients prior to their scheduled cardiac procedures and thus reduce the potential for associated complications.

3.13 Data Analysis

All data analysis was performed on SPSS software (20.0 Version). Prior to analysis, data was screened for data entry accuracy, and outliers were identified and validated. Descriptive statistics were calculated on demographic factors and study

variables in order to look at central tendencies and variability of the data. Data transformation was applied for all skewed distributions.

This study focused on four specific aims. Different statistical analysis methods were used to evaluate the following aims.

Aim 1: *Determine differences in levels of cardiac anxiety, state anxiety, and trait anxiety between male and female patients undergoing an outpatient cardiac procedure after controlling for previous history of an outpatient cardiac procedure.*

The working hypothesis is that compared to males, female patients undergoing outpatient invasive cardiac procedures experience higher levels of cardiac anxiety, state anxiety, and trait anxiety.

Aim 2: *Determine the differences in cardiac anxiety, state anxiety, and trait anxiety between patients with and without a history of heart disease and HTN admitted for elective invasive cardiac procedures in an outpatient preprocedural unit after controlling for previous history of an outpatient cardiac procedure.*

The working hypothesis is that patients with a history of heart disease and HTN could have higher levels of cardiac anxiety, state anxiety, and trait anxiety compared to those with no history.

For Specific Aim #1 and Aim #2, the analysis of covariance (ANCOVA) statistical analysis method was used to evaluate the effect of variables (cardiac anxiety, state anxiety, and trait anxiety) and to determine the difference in their levels among the two groups, male and female patients, and between patients with or without a history of heart disease and HTN controlling for prior history of outpatient cardiac procedure as a covariant. Descriptive statistics on all demographic factors and variables were done to

observe central tendencies and variability of the data. Additional tests such as Chi Square analysis and *t*-test was done to find difference between sociodemographic variables, health history, and gender.

Aim 3: *Analyze association among cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.*

The working hypothesis is that there could be significantly strong positive correlation among cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

For Specific Aim # 3, a Pearson correlations analysis was used to assess the strength of the relationship among cardiac anxiety, state anxiety, and trait anxiety and also to help identify the pertinent predictor variables for regression in order to minimize the possibility of committing Type I error in multiple regression analyses.

Aim 4: *Determine what health factors and socio-demographic variables best predict cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.*

The working hypothesis is that health factors like history of cardiac and EP procedure, heart disease, HTN, smoking, depression, use of alcohol and recreational drugs as well as socio-demographic factors like education, age and annual income could predict the level of cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

For Specific Aim #4, due to large number of explanatory variables which may or may not be relevant for making predictions about the independent variable, a step-wise

regression analysis method was used which allowed optimization of the prediction model with adequate power. This method was used to predict the association between health factors, socio-demographic variables and independent variables (cardiac anxiety, state anxiety, and trait anxiety). Stepwise regression combines forward selection of the independent variables that are the best predictors of the cardiac anxiety, state anxiety, and trait anxiety and backward elimination that removes the variables with the smallest *t* statistic ($p = .10$). The process continues until no more variables are removed (Forthofer, Lee, & Hernandez, 2006).

3.14 Chapter Summary

This chapter described the research design, methodology used in sampling, instruments used for data acquisition, and the statistical methods used for data analysis. It has also explained the procedure involved in data collection and the data safety monitoring plan. Patients who were frail, demented, and less than 30 years or more than 89 years of age were excluded from the study. A power analysis was done to determine the sample size necessary to test the hypotheses and minimize a Type II error. The instruments used for the measurement of the study variables have good reliability and validity. The methods used for data analysis in this study include ANCOVA, Pearson correlation and a stepwise regression. The results of the study and discussion are discussed in Chapter 4 and 5.

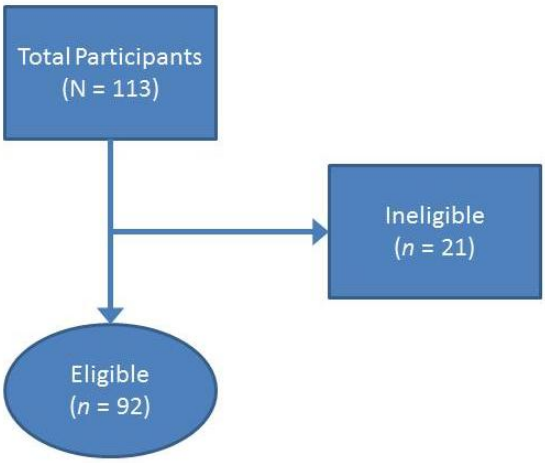
4. RESULTS

This chapter presents an overview of the survey responses and description of the socio-demographic characteristics of the sample followed by findings from the analytic testing of specific aims. A summary of the findings is provided at the end of the chapter.

4.1 Survey Response

The participant recruitment flow chart for this study is presented in Figure 2. A total of 113 people attempted the survey. Once responses were gleaned for missing data, cases with more than ten percent missing data were excluded from further analyses. For responses with less than ten percent missing data, a list wise deletion approach was adopted. In a list wise deletion approach, cases with missing data for a particular variable were excluded from the analyses involving that variable, but were included in analyses involving other variables. A total of 21 respondents either did not provide adequate information or did not meet the inclusion criteria of the study. Consequently, these respondents were excluded from the study, and the remaining 92 responses were eligible for further analyses.

Figure 2: Participant Recruitment Flow Chart



4.2 Socio-demographic Characteristics

Table 2 provides a summary of the socio-demographic characteristics of the survey respondents. In those instances where data was missing, statistics were reported for available data. The majority of the respondents were older adults (Mean = 59.5 years, SD = 13.7), Caucasian (n = 52, 57%), split in gender between male (n = 53, 57.6%) and female (n = 39, 42.4%) patients, with over ten years of education (Mean = 12.5, *SD* = 3.7). Approximately a third of the respondents were retired (n = 30, 32.6%), while a third were still employed (n = 34, 37.2%). Fewer than half were still married (n = 31, 33.7%), while the rest were mostly single (n = 22, 23.9%) or divorced (n = 20, 21.7%). The most frequently reported annual household income was under $15,000 (n = 31, 33.7%) while only a few reported making over $100,000 (n = 7, 7.6%).

Table 2

Socio-Demographic Characteristics of the Sample (N = 92)

Variable		*N* = 92	
		Mean	Standard Deviation
Age (years)		59.5	13.7
Years of Education		12.5	3.7
		Frequency	Percentage
Gender	Male	53	57.6
	Female	39	42.4
Race	White	52	56.5
	Black/African American	31	33.7
	Asian/Pacific Islander	2	2.2
	American Indian/Alaska Native	1	1.1
	Hispanic/Latino	3	3.3
	Two or more Races	1	1.1
	Others	1	1.1

Marital Status	Single (Never Married)	22	23.9
	Married	31	33.7
	Divorced	20	21.7
	Widow/Widower	12	13
	Separated	3	3.3
	Living with Significant Others	4	4.3
Employment	Employed/self-employed	34	37.9
	Retired (Mandatory)	30	32.6
	Unemployed	9	9.8
	Out of work/Disabled	17	18.4
	Student	2	2.2
Annual Income	Under $15,000	31	33.7
	$15,000-$24,999	7	7.6
	$25,000-$34,999	7	7.6
	$35,000-$49,999	15	16.3
	$50,000-$74,999	16	17.4
	$75,000-$99,999	2	2.2
	$100,000 and over	7	7.6

Pertinent health history of the respondents is summarized in Table 3. Three out of every four respondents reported having HTN (n = 71, 77.2%), while two thirds reported having heart disease (n = 60, 65.2%). Just over half reported getting a cardiac catheterization (n = 53, 57.6%), while a select few had an EP study (n = 15, 16.3%). Only a few reported a prior history of anxiety (n = 17, 18.5%) and depression (n = 21, 22.8%), and even fewer reported a prior history of stroke (n = 7, 7.6%). Less than a quarter reported being smokers (n = 22, 23.9%), and a few had a prior history of recreational drugs (n = 6, 6.5%). Most participants reported not being on psychiatric medication at the time of participation (n = 70, 76.1%).

Table 3

Health History of the Participants (N = 92)

Variables		Frequency	Percent
Heart Disease	No	32	34.8
	Yes	60	65.2
Hypertension	No	21	22.8
	Yes	71	77.2
Prev. Catheterization	No	39	42.4
	Yes	53	57.6
Stroke	No	85	92.4
	Yes	7	7.6
Prev. EP study	No	77	83.7
	Yes	15	16.3
Anxiety	No	75	81.5
	Yes	17	18.5
Depression	No	71	77.2
	Yes	21	22.8
Smoking	No	70	76.1
	Yes	22	23.9
History Rec. Drug	No	86	93.5
	Yes	6	6.5
Psych Meds	None	70	76.1
	Anxiety	4	4.3
	Depression	13	14.1
	Bipolar	5	5.4

The main outcome variables of this study were cardiac anxiety (CA), state anxiety (SA), and trait anxiety (TA). The mean (standard deviation), minimum and maximum values of the CA scores, TA scores, and SA scores, for the entire sample are presented in

Table 4. The mean score for CA was 27.9 (10.6) out of a possible score of 72 implying that the overall level of CA in the sample was low. The SA and TA scores were in the mid - 40's range out of a possible score of 80 implying moderate levels of SA and TA among the participants. However, Chi Square analysis and *t*-test has not shown any statistically significant difference between sociodemographic and health history variables among male and female patients.

Table 4

Descriptive Information for the Outcome/Criterion Variables in the Study (N = 92)

	N	Minimum	Maximum	Mean	Std. Deviation
Cardiac Anxiety Score	92	3	52	27.9	10.6
State Anxiety Score	92	28	62	45.3	6.5
Trait Anxiety Score	92	29	59	44.3	5.2

4.3 Reliability Analysis

The Reliability Coefficient (Cronbach's Alpha) for the CA Scale (CAS), The Spielberger State-Trait Anxiety Inventory Form-Y (STAI-Y) and the TA and SA Subscales of the STAI-Y were computed to determine the internal consistency reliability of the items that were aggregated to derive the scores. Internal consistency reliability reflects the correlation among items and the correlation of each individual item with the total score. This index ranges from 0.00 to 1.00. A value that approaches 0.90 is considered high, and the scale can be considered highly reliable (Portney & Watkins, 2009). Scales with Cronbach's alpha of less than 0.60 are considered less reliable (George & Mallery, 2003). Data analysis from this study indicated a Cronbach's alpha of 0.89 for the CAS and 0.60 for the overall STAI-Y inventory. SA and TA Subscales of

the STAI-Y had a Cronbach's alpha of 0.59 and 0.34 respectively. Therefore, for the current study, the STAI-Y SA subscale was borderline and the TA subscale was less reliable.

4.4 Specific Aims

Prior to testing each hypothesis, data was checked, and it did meet the assumptions of parametric statistics. These included scale level data for the dependent variables, independent observations, and normal distribution of the dependent variables. Assumptions specific to each statistical test were also tested and met.

Specific Aim 1: *Determine differences in levels of cardiac anxiety, state anxiety, and trait anxiety between male and female patients undergoing an outpatient cardiac procedure after controlling for previous history of outpatient cardiac procedure.*

The working hypothesis is that compared to males, female patients undergoing outpatient invasive cardiac procedures experience higher levels of cardiac anxiety, state anxiety, and trait anxiety.

Separate analyses of covariance (ANCOVA) revealed that after adjusting for previous history of cardiac procedure, no statistically significant differences ($p > .05$) were noted between male and female patients in their level of cardiac anxiety, state anxiety, and trait anxiety. Table 5 presents the unadjusted and adjusted means and standard deviations for male and female for their CA, SA, and TA. As evident from the group means presented in Table 5, the hypotheses that females have higher level of CA, SA, and TA than males were not supported.

Table 5

Adjusted and Unadjusted Mean (SD) for Cardiac Anxiety, State Anxiety and Trait Anxiety for Males and Females After Adjusting for Previous Cardiac Procedure (N = 92)

			Unadjusted	Adjusted*	
		n	Mean (*SD*)	Mean (*SD*)	*p* value[a]
Cardiac Anxiety	Male	53	28.3 (10.9)	28.1 (10.6)	.78
	Female	39	27.2 (10.3)	27.5 (10.5)	
State Anxiety	Male	53	44.7 (6.2)	44.7 (6.4)	.32
	Female	39	46.2 (6.7)	46.1 (6.6)	
Trait Anxiety	Male	53	44 (4.4)	44.1 (5.1)	.92
	Female	39	44.3 (5.9)	44.2 (5.1)	

* Adjusted means are based on ANCOVA analyses with previous cardiac procedure as a covariate

[a] The *p* values for the adjusted means are calculated for the ANCOVA.

Specific Aim 2: *Determine the differences in cardiac anxiety, state anxiety, and trait anxiety between patients with or without history of heart disease and HTN admitted for elective invasive cardiac procedures in an outpatient preprocedural unit after controlling for previous history of an outpatient cardiac procedure*.

The working hypothesis is that patients with a history of heart disease and HTN could have higher levels of cardiac anxiety, state anxiety, and trait anxiety compared to those with no history.

The ANCOVA revealed that after adjusting for previous history of cardiac procedure, statistically significant differences ($p < .05$) were noted in levels of SA, only between those with and without history of heart disease. No differences were noted between the groups for CA and TA. Table 6 presents the unadjusted and adjusted means and standard deviations for those with a history of heart disease for their CA, SA, and

TA. As evident from the adjusted group means, both SA and TA were higher in those with a history of heart disease compared to those who did not have any heart disease; however only the difference in SA was statistically significant.

Effect size was calculated from the group mean scores to standardize the difference in CA between those with and without heart disease. An effect size is considered to be the smallest immediate effect that is clinically meaningful in the target population for the outcome measure; in this case the CA score. The calculation revealed that although not statistically significant, the difference in CA between the groups corresponds to an effect size of 0.38. This, according to Cohen's index of effect size (Cohen's *d*), is close to a medium effect in keeping with his definition for difference between cell means. The relatively small sample of subjects without any heart disease may have contributed to a Type II error whereby, although not statistically significant due to lack of power, the difference between the two groups is large enough to be clinically relevant.

Table 6

Adjusted and Unadjusted Mean (SD) for Cardiac, State and Trait Anxiety for Those With and Without Heart Disease After Adjusting for Previous Cardiac Procedure (N = 91)

			Unadjusted	Adjusted*	
		n	Mean (*SD*)	Mean (*SD*)	*p* value[a]
Cardiac Anxiety	Heart Disease	60	24.2 (10.6)	24.7 (10.1)	.07
	No Heart Disease	31	29.4 (9.8)	29.1 (10.3)	
State Anxiety	Heart Disease	60	46.5 (6.3)	46.8 (6.4)	.003**
	No Heart Disease	31	42.8 (6.2)	42.2 (6.5)	
Trait Anxiety	Heart Disease	60	44.3 (5.7)	44.5 (5.3)	.25
	No Heart Disease	31	43.6 (4.9)	43.2 (5.4)	

* Adjusted means are based on ANCOVA analyses with previous cardiac procedure as a covariate
** $p < .05$ the *p* values for the adjusted means are calculated for the ANCOVA.

Separate ANCOVA analysis also revealed that after adjusting for previous history of cardiac procedure, statistically significant differences ($p < .05$) were noted in levels of CA between those with and without history of HTN. No differences were noted in SA and TA between hypertensive and nonhypertensive groups (see Table 7).

Table 7

Adjusted and Unadjusted Mean (SD) for Cardiac, State, and Trait Anxiety for those With and Without HTN After Adjusting for Previous Cardiac Procedure (N = 92)

			Unadjusted	Adjusted*	
		N	Mean (*SD*)	Mean (*SD*)	*p* value
Cardiac Anxiety	Hypertension	71	29.4 (10)	29.3 (10.1)	.02**
	No Hypertension	21	22.7 (11.2)	23 (10.5)	
State Anxiety	Hypertension	71	45.1 (7)	45.8 (6.6)	.70
	No Hypertension	21	46 (4.4)	45.2 (6.4)	

Trait Anxiety	Hypertension	71	44.1 (5.4)	44.1 (5.1)	.87
	No Hypertension	21	44.4 (4.1)	44 (5.3)	

* Adjusted means are based on ANCOVA analyses with previous cardiac procedure as a covariate
** $p < .05$ the p values for the adjusted means are calculated for the ANCOVA.

Due to the potential confounding effect of hypertension and heart disease on anxiety, separate Chi-square analyses were conducted to assess differences between males and females in their frequency of heart disease and hypertension in the sample. Frequencies of those reporting heart disease and hypertension differentiated by gender are presented in Table 8. As evident, males and females did not differ significantly ($p > 0.05$) in their frequency (percentage) of those with heart disease and hypertension. However, it should be noted that a higher percentage of males were reported being hypertensive and with heart disease. Thus the potential confounding effect of these two conditions on the comparison of anxiety levels between males and females cannot be ruled out completely. It is likely that the higher incidence of heart disease and hypertension among males may have contributed towards elevating their anxiety levels.

Table 8

Comparison of Frequency of Heart Disease and Hypertension by Gender (N = 92)

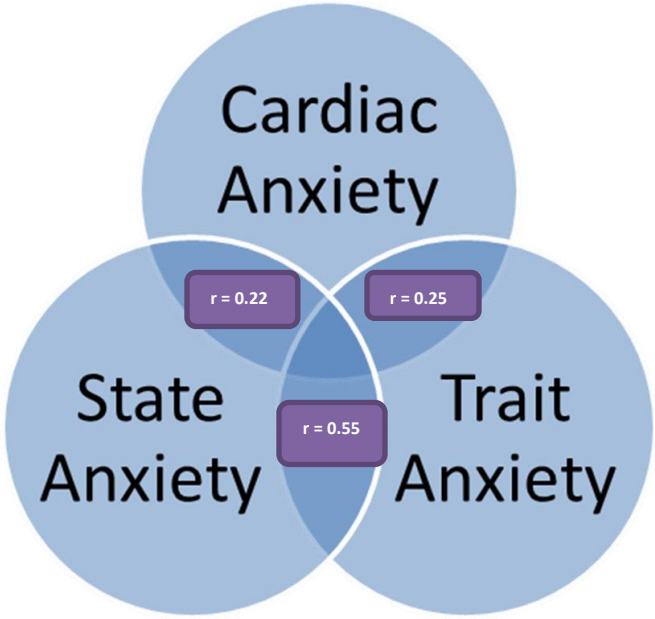
Variable		Frequency (%)		*p* value
		Males (n = 53)	Females (n = 39)	
Heart Disease	Yes	37 (71)	23 (59)	0.23
Hypertension	Yes	43 (81)	28 (72)	0.29

Specific Aim 3: *Analyze association among cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.*

The working hypothesis is that there could be a significantly strong positive correlation among cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

Separate Pearson product moment correlation (*r)* analyses were conducted to assess the strength of the relationship among CA, SA, and TA. The analysis revealed statistically significant correlation between SA and TA of moderate strength ($r = 0.55$; $p < .05$). CA was only fairly correlated with SA (0.22) and TA (0.25), although both relationships were statistically significant ($p < .05$) as shown in Figure 3.

Figure 3: Correlation among Cardiac, State, and Trait Anxiety



Note. Created by Shajimon, B. 2013

Specific Aim 4: *Determine what health factors and socio-demographic variables best predict cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.*

The working hypothesis is that health factors like history of cardiac and EP procedure, heart disease, HTN, smoking, depression, use of alcohol and recreational drugs as well as socio-demographic factors like education, age and annual income could predict the level of cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

Three separate stepwise regression analyses were conducted to determine the best linear combination of socio-demographic and health factors that predicted CA, SA, and TA scores in the sample. A step-wise approach was deemed appropriate since it allowed for the optimization of the prediction model with adequate power, and since only the predictors that significantly contributed towards the prediction were included in the final model.

In the case of CA, the predictors included income, history of heart disease, HTN, and use of recreational drugs. These predictors were selected since they were at least moderately correlated (0.2 or higher) with CA. Results from the step-wise regression analysis revealed that annual income, when entered by itself in the regression model, was the most significant predictor of CA ($F_{1, 85} = 9.4$, $p = .003$); however the combination of annual income and history of heart disease significantly improved the predictability of the model ($F_{2, 84} = 8.4$, $p = .001$). This was evident from the increase of the R^2 value from 0.10 to 0.17 indicating that when both annual income and history of heart disease were entered as predictors, the model explained 7% more variance in CA scores. None of the

other predictors strengthened the prediction model or contributed towards explaining the variance any further. Multicollinearity tests indicated that the assumption of no multicollinearity among the predictors was not violated. This was supported by the correlation between the predictors being less than 0.70 and the high tolerance values of the predictors in the regression analysis. Tolerance values more than 1 - R^2 (0.84) indicated negative multicollineraity (Leech, Barrett, & Morgan, 2005). As seen in Table 9, the negative beta coefficient for income suggests that CA decreases as income increases, whereas the positive beta coefficient for heart disease suggests that CA is higher in people that have heart disease.

Table 9

Stepwise Regression Summary Showing the Two Models of Best Fit with the Predictor Beta Coefficients, Level of Significance, and the 95% Confidence Interval of the Beta Coefficients

Model	Predictors	Beta	Significance	95.0% CI for Beta	
				Lower Bound	Upper Bound
1	(Constant)	32.5		28.7	36.3
	Annual Income	-1.6	0.003*	-2.7	-0.6
2	(Constant)	29.0		24.4	33.5
	Annual Income	-1.7	0.001*	-2.7	-0.7
	Heart Disease	5.7	0.011*	1.4	10.1

*$p < .05$ Criterion: Cardiac anxiety score

Step-wise regression analysis for SA revealed that history of heart disease was the only significant predictor of SA ($F_{1, 85} = 7.8$, $p = .007$) with an R^2 value of 0.08 indicating that the model was able to explain 8% variance in SA scores. As seen in

Table 10, the positive beta coefficient suggests that SA is higher in those with heart disease. Finally, a prediction model could not be developed for TA as none of the predictors made a significant contribution to the prediction.

Table 10

Stepwise Regression Summary Showing the Predictor Beta Coefficient, Level of Significance, and the 95% Confidence Interval of the Beta Coefficients

Model	Predictor	Beta	Significance	95.0% CI for Beta	
				Lower Bound	Upper Bound
1	(Constant)	42.6		40.3	44.8
	Heart Disease	3.9	0.007*	1.1	6.7

*$p < .05$ Criterion: State anxiety score

Chi-square analysis was also performed to test whether annual income was different between males and females since annual income has been shown to be a predictor of anxiety. As seen in Table 11, no significant difference ($p > 0.05$) was noted between males and females in their distribution of annual income.

Table 11

Comparison of Frequency of Annual income by Gender (N = 92)

Variable		Frequency (%)		*p* value
		Males (n = 53)	Females (n = 39)	
Annual Income	Under $25,000	21 (40)	24 (61)	0.06
	$25,001 - $50,000	16 (30)	6 (15)	
	$50,001 - $75,000	10 (19)	6 (15)	
	Over $75,000	6 (11)	3 (9)	

4.5 Chapter Summary

Of a total of 113 people who attempted the survey, 21 respondents either did not provide adequate information or did not meet the inclusion criteria of the study. The remaining 92 respondents were deemed eligible for study participation. Respondents were primarily older adults (Mean = 59.5 years, *SD* = 13.7), Caucasian (n = 52, 57%), both male (n = 53, 57.6%) and female (n = 39, 42.4%) patients, with over ten years of education (Mean = 12.5, *SD* = 3.7). Three out of four respondents reported having HTN (n = 71, 77.2%), while over two thirds reported having heart disease (n = 60, 65.2%). Just over half reported getting a cardiac catheter (n = 53, 57.6%), while a select few had an EP procedure (n = 15, 16.3%). Other infrequently reported medical history included anxiety (n = 17, 18.5%), depression (n = 21, 22.8%), and stroke (n = 7, 7.6%).

The Reliability Coefficient (Cronbach's Alpha) for the Cardiac Anxiety Scale (CAS), The Spielberger State-Trait Anxiety Inventory Form-Y (STAI-Y) and its TA and SA Subscales of the STAI-Y revealed that for the current study both the scales provided reliable data; however, the data from the STAI-Y TA anxiety subscale in particular may be less reliable.

Separate analyses of covariance (ANCOVA) revealed that after adjusting for previous history of cardiac procedure, no statistically significant differences ($p > .05$) were noted between male and female patients in their level of CA, SA, and TA. Therefore the hypotheses that female patients have higher level of CA, SA, and TA than male patients were not supported.

Another set of ANCOVA analyses revealed that after adjusting for previous history of cardiac procedure, statistically significant differences ($p < .05$) were noted in

levels of SA only between those with and without history of heart disease. No differences were noted for CA and TA. Statistically significant differences *($p < .05$)* were noted in levels of CA between those with and without history of HTN. No differences were noted in SA and TA between hypertensive and nonhypertensive groups.

Separate Pearson product moment correlation (*r)* analyses that were conducted to assess the strength of the relationship among CA, SA and TA anxieties showed a statistically significant correlation among the three variables; however, the relationship between SA and TA was of moderate strength ($r = 0.55$; $p < .05$), while the correlation of CA with SA ($r = 0.22$) and TA ($r = 0.25$) was fair.

Results from the step-wise regression analysis revealed that annual income, when entered by itself in the regression model, was the most significant predictor of CA ($F_{1, 85} = 9.4$, $p = .003$); however, the combination of annual income and history of heart disease significantly improved the predictability of the model ($F_{2, 84} = 8.4$, $p = .001$). Step-wise regression analysis for SA revealed that a history of heart disease was the only significant predictor of SA ($F_{1, 85} = 7.8$, $p < .007$). A prediction model could not be developed for TA as none of the predictors made a significant contribution to the prediction.

4.6 Chapter Conclusion

A summary of the most significant results in this study are as follows:

1. In both male and female patients, a statistically significant difference was not noted in their levels of CA, SA, and TA.
2. Individuals with a history of heart disease had a higher level SA and TA; however, only the difference in SA was statistically significant.

3. A diagnosis of HTN was associated with a higher level of CA. No differences were noted in SA and TA between hypertensive and nonhypertensive groups.
4. This study found a positive correlation among CA, SA, and TA, a relatively weak correlation between CA with SA and TA, and a strong correlation was found between SA and TA.
5. Finally, a disparity in anxiety level was noted in individuals according to annual income status and a history of heart disease. These factors were found to be the most significant predictors of CA. CA decreases as income increases, whereas CA is higher in people who have heart disease. However, a history of heart disease was the only significant predictor of SA revealing that SA is higher in those with heart disease. A prediction model could not be developed for TA, as none of the predictors made a significant contribution to the prediction.

5. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter could discuss the results of the study. The chapter begins with a discussion of the research question, specific aims, research hypothesis, and central hypothesis identified in the previous chapter. In addition, this chapter could include a discussion of the sample and post hoc analysis and a discussion of the operationalization of the conceptual and theoretical framework. The chapter concludes with a discussion about the study's significance for nursing practice, its limitations, and recommendations for future studies, closing with an overall study and chapter summary.

5.2 Research Discussion

The purpose of this study was to determine the difference in cardiac anxiety (CA), state anxiety (SA), and trait anxiety (TA) in male and female patients admitted for invasive cardiac procedures in a hospital-based preprocedural unit so that the specific anxiety could be identified and properly treated and managed. The diagnosis and treatment of cardiovascular disease is most commonly achieved by invasive cardiac procedures. The anticipation of being diagnosed with CVD, the possibility of having a coronary artery bypass surgery, the possibility of death, and other procedure related complications elicit anxiety. Prior studies have demonstrated that individuals with cardiac diseases or cardiac symptoms experience elevated health-related anxiety and that this contributes to dysfunctional bio-behavioral processes like persistent worry or rumination about illness. These studies further demonstrate that individuals, especially with cardiac diseases or cardiac symptoms, may experience high level of health related anxiety preoperatively such as cardiac, SA, or TA anxiety that significantly produced

physiological variations requiring increased hospitalizations for cardiac symptoms (Aikens, Michael, Levin, Myers, & et al., 1999; Szekely et al., 2007). Several studies have reported the presence of anxiety prior to cardiac procedures (Astin et al, 2005; Lunden et al, 2006). However, there is no study that looked at the most prevalent type of anxiety in the preprocedural unit. This is the first study to look at the three different types of anxieties and find the most prevalent type of anxiety that is present in the preprocedural unit where patients are waiting for invasive cardiac procedures.

5.3 Specific Aims and Research Hypothesis

There were four specific study aims. These study aims explored the three types of anxiety in a preoperative setting among both men and women.

Aim 1: *Determine differences in levels of cardiac anxiety, state anxiety, and trait anxiety between male and female patients undergoing an outpatient cardiac procedure after controlling for previous history of an outpatient cardiac procedure.*

Hypothesis1: When compared to males, female patients undergoing outpatient invasive cardiac procedures could experience higher levels of CA, SA, and TA anxiety.

Hypothesis 1 was not supported. This study found that CA, SA, or TA anxiety levels, on average, were similar between male and female patients; however, a slightly higher level of SA and TA was noticed in female compared to male patients. Although other studies have found that the female patient's preoperative level of anxiety was significantly higher than the male patient's preoperative level since they experienced more psychological stress and anxiety (Gallagher et al., 2010; Heikkila et al., 1999; Heikkila et al., 1998: Sykes, Evans, Boyle, McIlmoyle, & Salathia, 1989). The results in these studies might have been biased, as there were fewer female compared to male patients in the sample,

which would provide less reliable data due to smaller sample size. Furthermore, the sample in these prospective studies which were conducted outside U. S. had a predominantly higher male to female ratio of 3:1 and were an average of 66 years of age, 80% married, and 60% employed compared to the present study done in the U. S. with relatively more female participants with a 3:2 male to female ratio, average age of 60, over 10 years of education, two-thirds employed, and mostly single or divorced.

Anxiety scores were low and, on average, were similar in this study among male and female patients which may be attributed to the following factors: younger mean age (60 years), relatively comparable sample size, and being single/divorced. This finding can be supported by the results of 2006 Lau et al.'s study of 1058 young twins (age 8-16) which showed no age or gender difference in SA and TA. The results of few other studies also have emphasized that single and young male and female patients are less fearful and anxious compared to married, older couples since they are more independent and responsible for their own care. It is also possible that being single or divorced, both male and female patients without any significant others in life, prepare themselves mentally to overcome the diagnosis and outcome and handle stress at the same level. They are less affected by social acceptance by either sex and accept total responsibility for themselves compared to older adults. Married couples, especially women, are very dependent on their spouses and tend to get more anxious in anticipation of the lack of support, particularly when they are diagnosed with a life threatening heart disease for which they have to undergo lifelong treatment (Con, Linden, Thompson, & Ignaszewski, 1999).

Aim 2: *Determine the differences in cardiac anxiety, state anxiety, and trait anxiety between patients with or without history of heart disease and HTN admitted for elective invasive cardiac procedures in an outpatient preprocedural unit after controlling for previous history of an outpatient cardiac procedure.*

Hypothesis 2: Patients with history of heart disease and HTN could have higher levels of cardiac, SA and TA anxiety compared to those with no history.

Hypothesis 2 was partially supported. CA was significantly higher in patients with HTN and SA was significantly higher in those with heart disease only. TA was not different for any of the health conditions.

Statistically, no significant difference was noted in CA and TA in those with history of heart disease. However, a statistically significant difference was seen in SA in patients with and without heart disease. Individuals with heart disease were found to have a high level of SA compared to those with no heart disease. Yet a small difference was noted in the level of CA in patients with and without heart disease which is clinically relevant. It is interesting that patients without heart disease were found to have a higher level of CA than those with a history of heart disease, although TA was found to be slightly higher in those with a history of heart disease. Patients who have not been given a diagnosis of heart disease or have a previous history of heart disease, but who are in the process of being diagnosed with invasive cardiac procedures are most likely to be concerned about their heart and its functioning based on the belief that heart disease could lead to negative consequences (e.g., pain, death; Eifert, Zvolensky, & Lejuez, 2000). Therefore, these patients are more likely to have high level of heart focused CA than those with a known history of heart disease, who already have the experience of

living with heart disease and its consequence. These individuals may have made adjustments in their lives and have learned to live with their diagnosis. Hence, the patients with heart disease were less focused on their heart and its functioning compared to those without heart disease.

In contrast, patients with heart disease may be more focused on the procedure and its related complications. As a result, they experienced a higher level of state. These findings are supported by the data from the study by Eifert, Zvolensky, & Lejuez (2000) which reported that patients without a diagnosis of heart disease but with chest pain symptoms (cardiac or noncardiac related) have a hyper-vigilance and response bias for cardiac sensations and events. Thus the patients who experience cardiac related symptoms and are anticipating a diagnosis of heart problems after the invasive cardiac procedure could likely be more vigilant on their cardiac sensation, which could lead to CA and which shares similar characteristics to phobic anxiety.

On the other hand, patients with known heart disease who were admitted for further diagnosis or treatment of their existing cardiac problem are more focused on the procedure and its associated complications, which can lead to SA in preprocedural unit. It was also found that patients with cardiac related symptoms for more than four months report intense autonomic sensations generally and cardiac symptoms specifically, compared to those without a chronic history (Aikens Michael, Levin, Myers, & et al., 1999). Since CA and SA share similar characteristics of phobic anxiety which are triggered by specific fear cues responsible for producing anxiety, they are associated with an elevated risk of death related to heart disease as phobic anxiety (Haines, Imeson, & Meade, 1987; Kawachi, Colditz, & et al., 1994). These are important findings because it

means that regardless of the history of heart disease, all patients should be assessed and managed for CA, SA, and TA since a difference may exist. However, in this study the difference between the two groups was large enough to be clinically relevant, as indicated by a medium effect on Cohen's index of effect size (0.38). The relatively small sample of subjects without any heart disease (n = 31) compared to those with heart disease (n =60) may have contributed to a Type II error whereby, although not statistically significant due to lack of power, the difference between the two groups is large enough to be clinically relevant. Since CA is a type of phobic anxiety that is relevant to a number of clinical and medical syndromes and produces psychological and physiological distress, along with their chronic characteristic, it may increase the patient susceptibility to ventricle fibrillation leading to an increased risk for sudden cardiac death (Albert et al., 2005).

In this study, a statistical difference was not noted in SA and TA between hypertensive and nonhypertensive groups. However, a statistically significant difference was noted in levels of CA between those with and without history of HTN. Patients with a history of HTN were found to have a higher level of CA than those with no history of HTN, and there was absolutely no difference in SA and TA between these two groups. Patients admitted for invasive cardiac procedures who reported HTN in their past medical history are aware of their hypertensive status and thus they were more likely to be anxious in the preprocedural unit. Findings from previous studies have shown a relationship between HTN and SA (Jeter, Bush, & Porter, 1998; Jhalani et al, 2005; Spruill et al., 2007). Studies have reported that the perception of being hypertensive was associated with greater anxiety in a clinical setting independent of the true blood pressure

level (Spruill et al., 2007). In addition, the findings from Spruill et al. (2007) also revealed that the patients labeled or diagnosed with HTN had a high level of SA compared to those who were nonhypertensive.

HTN or high blood pressure is known to increase the risk of CVD (Gerend et al., 2004). Vasan et al.'s (2001) study done with the Framingham Heart Study cohort (N = 6,859) provided further evidence on the association between HTN and incidence of CVD. They found that patients with a higher baseline blood pressure had an increase in cardiovascular event rate (myocardial infarctions, stroke, congestive heart failure), including death from CVD. The anticipation of receiving negative or frightening information from their clinicians related to HTN and CVD and the perceived threat associated with fatal or catastrophic consequences resulted in high anxiety (Spruill et al., 2007). The individual's response to health threats has significant effect on both cognitive and emotional process. Evidence supported that in patients with HTN, the perception of the associated health threat attributed to serious medical condition would activate the emotional processing pathway which elicited anxiety and led to cardiovascular events (Gerend et al., 2004). Studies have also found that patients who had been informed or labeled with HTN diagnosis have an increased sympathetic response to stress compared to those without the diagnosis of HTN (Rostrup, Mundal, Westheim, & Eide, 1991). Therefore, the diagnosis or labeling of HTN in patients should be done very carefully, since it may provoke unintended negative consequences. Patients who are truly hypertensive and are treated for HTN should be assessed and managed for anxiety in clinical settings (Gerend et al., 2004). Based on the result from this study, management of CA and SA in patients with and without a history of heart disease and HTN is

recommended prior to hospital admission for invasive cardiac procedures to prevent unintended negative consequences. Early assessment and management of anxiety could help tailor specific interventions, manage anxiety symptoms appropriately, and prevent pathologic and physiological changes and adverse outcomes pre and postprocedures.

Aim 3: *Analyze associations among CA, SA, and TA in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.*

Hypothesis 3: There could be a significantly strong positive correlation among cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

Hypothesis 3 was partially supported. There was a significant positive correlation among CA, SA, and TA in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit. Although a positive correlation was found among CA, SA, and TA, a relatively weak correlation was found between CA with SA (.22) and TA (.25), but a strong correlation was found between SA and TA (.55). However, all correlations were statistically significant ($p < .05$) suggesting that preprocedural anxiety is a multidimensional construct consisting of parts of CA, SA, and TA. Indeed, this is precisely what was found in Smoller and Tsuang's (1998) study which indicated that anxiety was composed of various dimensions with underlying different aspects of vulnerability. In this present study, it is evident that patients who came in for elective invasive cardiac procedures were more concerned about the procedure and complications than their heart health. However, patients with TA were found to be more at risk for developing severe SA while in the preprocedural unit and CA in the outpatient clinic or doctor's office, because they were predisposed to respond to the threatening situation due

to the inherited TA. Individuals with TA have characteristics called motives which are the dispositional tendencies or residues of past experience that are latent until the cues of the situation activate them (Spielberger et al., 1983). TA acts as a trigger factor placing patients at high risk for developing SA and CA as it is associated with cognitive biases which have genetic underpinnings (Muris, Rapee, Meestsers, Schouten, & Geers, 2003).

Under threatening circumstances, genetically mediated TA disposition is expressed through the tendency to respond as SA, which is the product of interaction between the disposition and a stressor and which suggests that SA also has a genetic vulnerability to environmental stressors to produce anxiety symptoms (Endler & Kocovski, 2001; Lau et al., 2006; Spielberger, 1996**).** Therefore, in the preprocedural unit, individuals with TA, when exposed to environmental stresses, could have an intensified level of SA. In contrast, patients seen in clinics are not exposed to intensified environmental stressors. Their visit to the clinic may be for routine follow-up care or for evaluation of heart related symptoms. They anticipate going home after a check-up or obtaining a recommendation for further evaluation and treatment for their heart related problems. In the clinic, when patients anticipate or are newly-given a diagnosis of heart disease or are being told about the poor prognosis of their existing heart problems that endanger their life, CA may develop, which intensifies over time and becomes chronic in nature. Studies have reported that anxiety was a known risk factor for progressive cardiovascular disease and cardiovascular events among medically managed patients (Gullette et al., 1997; Stengrevics et al, 1996; Couldiams et al., 2013). Hence, a timely and appropriate diagnosis and treatment of the specific type of anxiety could perpetuate

less psychological and physiological impact in the procedural unit and outpatient cardiology office. This could ultimately prevent pre and postprocedural complications.

The weak relationships among CA and TA in this study was likely due to the fact that the data obtained from the TA subscale was less reliable, which could be accounted for by the difficulty in interpretation of the questions as more than 50% of the subjects had either high school (33%) or a lower (21%) level of education. It is possible that the subjects' answers were biased with a lesser understanding of the questions. Therefore, further research and development of the TA subscale is necessary to improve sensitivity for detecting TA.

In summary, it is evident that preprocedural anxiety is a multidimensional construct which positively correlates to the interrelated CA, SA, and TA although they differ in characteristics. It is evident that there is a statistically significant correlation between CA, SA, and TA although they differ in characteristics. This finding suggests that individuals who are susceptible to anxiety may experience anxiety at any time as a response to a threatening situation. The type and level of anxiety depends on the situation that activates them and the disposition of the stressors. Therefore, an individualized intervention may be tailored with focus on the underlying stressors to provide effective treatment.

Aim 4: *Determine what health factors and socio-demographic variables best predict cardiac anxiety, state anxiety, and trait anxiety in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit so that the specific anxiety can be identified and properly treated and managed.*

Hypothesis 4: Health factors like history of cardiac catheterization and EP procedure, heart disease, HTN, smoking, anxiety, depression, use of alcohol and recreational drugs as well as socio-demographic factors like education, age, and annual income could predict the level of CA, SA, and TA in patients admitted for elective invasive cardiac procedures in an outpatient preprocedural unit.

Hypothesis 4 was also partially supported. The stepwise regression analyses revealed that for CA, annual income and history of heart disease were significant predictors. The results of this analysis indicated that an increase in annual income decreased the level of CA (β =-1.6, p = .001), whereas a history of heart disease in a patient increased the level of CA (β = 5.7, p = .011). For SA, a history of heart disease was the only significant predictor. SA was found to be higher in patients with a history of heart disease (β = 3.9, p = .007). For TA, nothing contributed to the prediction.

Research has suggested that social factors such as poverty and unemployment increase the risk of heart disease due to unintended stress (Anderson & Armstead 1995; Pincus & Callahan, 1995). Individuals with low income who either have a history of heart disease or experience heart related symptoms or anticipate a diagnosis of life-threatening heart condition could be worried about the cost of treatment and life-threatening events associated with untreated heart disease. It is not surprising that symptoms related to heart disease may heighten anxiety, because these symptoms may make patients suspicious of being diagnosed with heart problems. This heart-focused anxiety could give rise to CA which could become persistent and interfere with a person's daily life functioning. The worries about heart disease, its effect on life and difficulty in adapting to lifestyle changes, and its life threatening consequences because of not getting

appropriate treatment due to no income or low income would likely produce intensified heart-focused CA. Individuals with higher annual income may be optimistic about getting the best possible treatment for their heart problems and have better quality of life. They could go forth in life with less focus on heart disease, as a result, they could have less heart-focused anxiety.

This study has revealed that individuals with CA have a negative relationship with annual income and a positive relationship with a history of heart disease. Primarily, individuals with heart disease are likely to be anxious because of their heart conditions. Therefore, when they are exposed to another stressful situation like being in the preprocedural unit for an invasive cardiac procedure, with anticipation of something unpleasant about to happen, a poor prognosis, or a life-threatening event, it may possibly provoke situational anxiety leading to intensified SA. Annual income should have no effect in the preprocedural unit when patients are admitted for an elective procedure which has been preapproved by insurance company. These individuals do not have to worry about the payment for the procedure unless they have no insurance plan and are planning to pay out-of-pocket. This seldom happens, because invasive cardiac procedures are very expensive making them unaffordable to the truly uninsured. Therefore, annual income does not provoke SA in preprocedural unit. The subjects in this study were admitted for an elective invasive cardiac procedure. Since admission was possible only after the preapproval by the insurance company, information about their health insurance plan was not obtained. As the subjects had no financial burden towards their procedure, a positive correlation between income and SA was not revealed.

In summary, a history of heart disease could increase the level of SA in anticipation of the associated complications and poor prognosis during or after the procedure. The names and a history or diagnosis of HTN could provoke CA. Evidently annual income and a history of heart disease were found to be predictors for CA and heart disease alone was a predictor of SA. Since TA is a personality trait with a genetic link, there were no social predictors unless a link with the family history was established. However, individuals with a history of heart disease who were more concerned about effective treatment, poor prognosis, and difficulty in adapting to lifestyle changes could experience higher levels of CA whereas in the preprocedural unit, patients experienced more SA due to the intense stressful environment. Early and appropriate diagnosis of the specific type of anxiety could help in tailoring effective treatment and management thus reducing negative consequences.

Additional statistical analysis such as Chi Square analysis and *t*-test revealed that more than 50% of the subjects had a low level of education, high school or less. Individuals with low educational status or low health literacy may have increased anxiety that could result in unfamiliarity with the healthcare environment (Williams et al., 2013). These individuals are likely to have increased adverse events due to non-adherence to the postprocedural plan of care.

5.4 Discussion of Sample

The subjects in the sample were predominantly Caucasians, approximately 60 years old, single or divorced, educate at the high school level, mostly employed with an annual household income of under $15,000. However, on average, women were significantly older than men and more women than men had a history of HTN, heart

disease, which were found to be the predictors of anxiety. Nevertheless, a majority of them did not report being on psychiatric medication at the time of participation in the study. This sample might not truly represent the larger population, as it was recruited from a convenient setting in a large urban hospital. Therefore, generalizability of the results may not be achieved.

5.5 Attrition from Sample

In the study sample, 21 respondents of a total of 113 people that attempted the survey either did not provide adequate information or did not meet the inclusion criteria of the study. This is only about 19% of the total respondents who did not participate in the study. The remaining 92 respondents were eligible for study participation. There was no attrition bias in this study even though the sample had decreased, but it attained the estimated sample size in order to achieve 80% power to detect a difference of .5 in the mean.

5.6 Marten's Multi-Dimensional Anxiety Theory

Anxiety is a discrete emotional experience, which may be described as having cognitive, neurobiological, and behavioral components. It is conceptualized in many ways such as a trait, a state, a stimulus, a response, a drive, and a motive. Anxiety states are characterized by "subjective feelings of tension, apprehension, nervousness, and worry, and the activation or arousal of the autonomic nervous system" (Spielberger et al., 1983, p. 4).

Anxiety is found to be "influenced by the cultural milieu in terms of both the situational encounters that elicit anxiety and the manner and style in which the experience of anxiety is perceived and understood" (Endler, 1997, p. 137). Emotional arousal has

been related to various learning experiences including conditioning process. Decades of neuroscientific and learning research indicate that anxiety reactions occurs as a result of higher-order conditioning of the autonomic nervous system to certain environmental events and situations. Higher-order conditioning process forms the basis for human learning. As referred by C. Nezu, Martell, & A. Nezu (in press), higher-order conditioning includes the process of associative learning that occurs when a previously conditioned stimulus is paired with a new conditioned stimulus. Research in associative learning have shown that common emotional experience that impact our daily life due to various stimuli can be partially linked to high conditioning. Various stimuli (external or internal) may actually alter the sensitivity and reactivity of neuroendocrine system that mediates the stress response which may either produces heightened emotional arousal or lowers the threshold for arousal (as cited in C. Nezu, Martell, & A. Nezu). However, learning behaviors of different individuals vary based on individual differences concerning temperament vulnerability, the impact of prior experiences, the impact of contextual variables during conditioning, and the impact of post-event variables (C. Nezu, Martell, & A. Nezu). Studies have demonstrated that brain chemistry imbalances are also a very likely cause of anxiety disorders. Evidence supports that people suffering from anxiety often have deregulation of neurotransmitters (brain chemicals) which includes serotonin, norepinephrine and gamma-aminobutyric acid (GABA). These neurotransmitters may get activated with exposure to a potential dangerous stimulus (Borne, 2006; Brawman-Mintzer, & Lydiard, 1997).

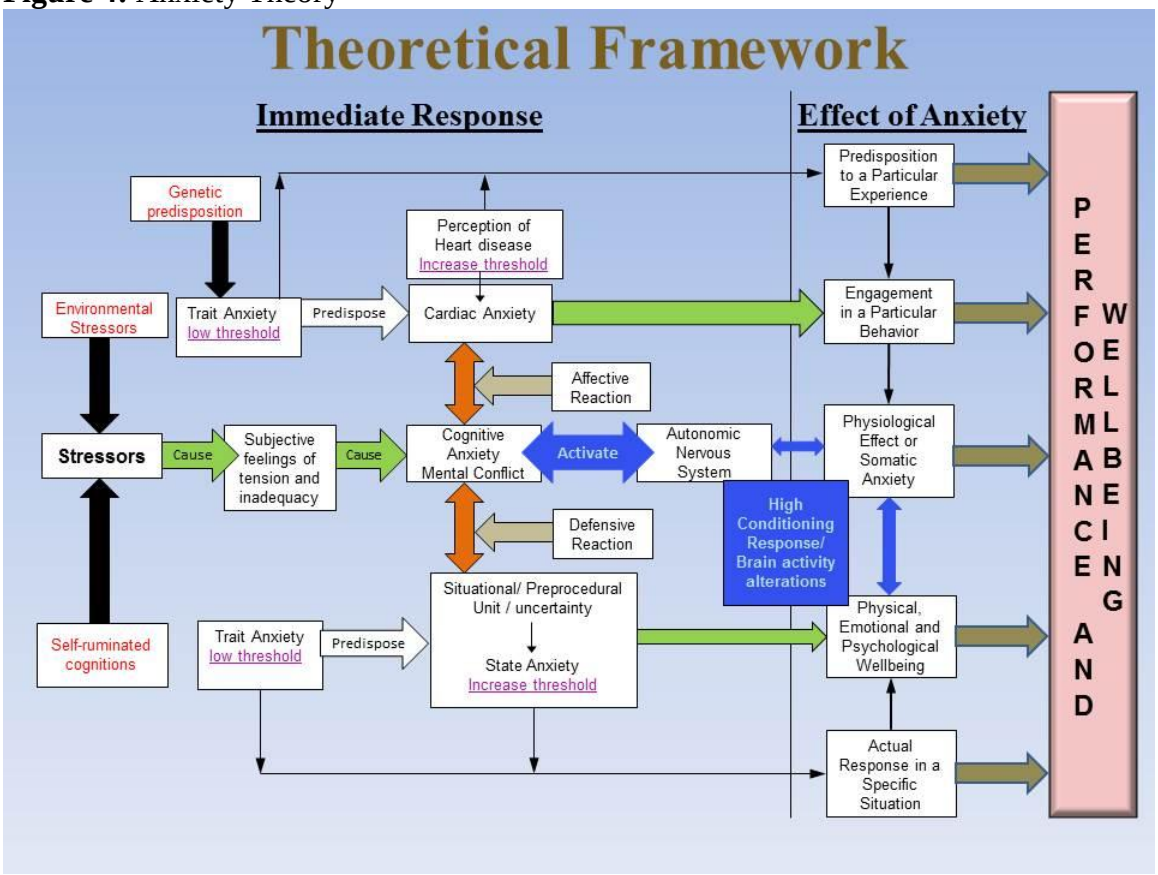
The cognitive processing of life stressors is linked to the activation of the amygdala, a part of the limbic system, which can ingrain itself with cognitive

conditioning. This leads to difficulty in perceiving accurate cues for fear and can result in hyperactive anxiety states. The amygdala has been related in the origin of anxiety disorders because it links emotion to physical reaction and memory. The interconnections among the regions in the limbic system are responsible for recognition and activation of emotion-related behaviors, including fear and anxiety (Borne, 2006; Brawman-Mintzer, & Lydiard, 1997). The neurotransmitters and neuropeptides mediate activation of such pathways and associated symptomatology. Variations in anatomical activation and/or neurotransmitter action/sensitivity may be responsible for the different types of anxiety disorders (such as CA, SA, and TA), and these variations may partly result from genetic phenotypes and/or neuroendocrine stressors resulting from trauma (Kim &Gorman, 2005).

SA, TA, and CA are the multidimensional constructs that are the focus of this study, which involve both subjective aspects and physiological symptom manifestations of these three types of anxiety. They are also explained using Martens' multi-dimensional anxiety theory (MAT) which has identified the symptoms of cognitive and somatic anxiety. In fact, anxiety symptoms are distinguished on three levels: cognitive, somatic, and behavioral (Mackenzie, 2010). MAT explains the association among the symptoms of anxiety and the separation of cognitive from somatic anxiety (Martens, Burton, Vealy, Bump, & Smith, 1990). Based on MAT, patients who experience anxiety (CA, SA, or TA) would follow a pattern of subjective feelings of tension and inadequacy combined with heightened arousal of their autonomic nervous system (Hackfort & Schwenkmezger, 1989). According to MAT, the self-ruminated cognitions in patients with CA, SA, and TA developed from focusing on the inadequacies, potential failures,

and anticipation of being diagnosed with life-threatening CVD that is associated with cognitive anxiety. This cognitive anxiety would then lead to emotional or autonomic responses causing sympathetic nervous system arousal resulting in somatic anxiety (Endler, 1983; Endler, Parker, Bagby, & Cox, 1991). An increase in the sympathetic nervous system response would then escalate anxiety symptoms that would affect the person's physiological hemodynamics and the physical, emotional, and psychological wellbeing (Mackenzie, 2010; Morris et al., 1981). Therefore it is important to identify preprocedural anxiety to promote collaboration among cardiovascular physicians with psychiatric services to reduce emotional stress and reduce adverse events.

Figure 4: Anxiety Theory



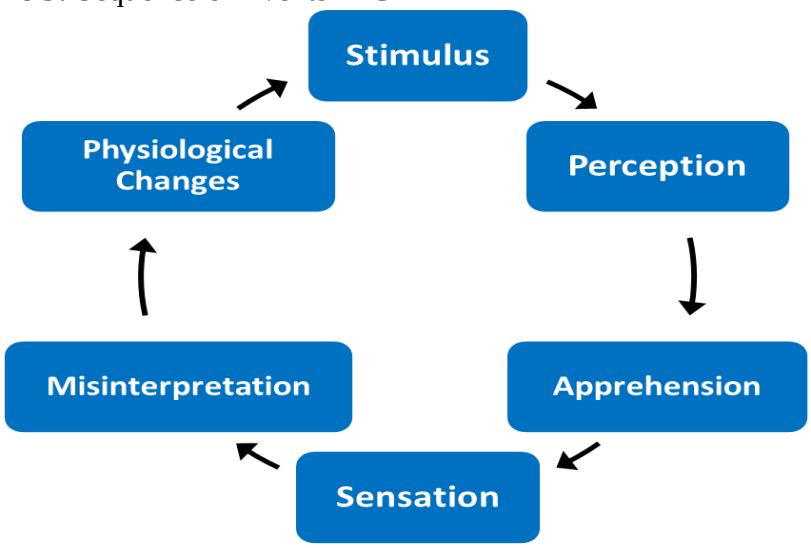
Note. Created by Shajimon, B. 2013 based on anxiety theories.

Using MAT, the specific subcomponents of CA, SA, and TA can be identified. In patients with CA, the individual's cognition and experience of cardiac-related symptoms along with his or her preconceived notion of aversive and dangerous nature of heart disease could elicit CA. The sequence of events in CA include: a) an external or internal trigger or stimulus, b) perception of stimulus as a threat, c) apprehension, d) body sensation, e) interpretation as catastrophic sensation, and f) abnormal physiological change (see Figure 5). SA is a function of the interaction between the person and situation variables (Endler, 1983; Endler at al., 1991) and between the interaction of a specific dimension TA (e.g., social evaluation) and a congruent situational threat. Since individuals with TA have a predisposition to experience anxiety in different threatening situational contexts as in social evaluation, physical danger, ambiguous, (Endler, Hunt, & Rosenstein, 1962), loss, or conflict (Endler, 1983), they could have significantly increased SA when they are exposed to a congruent threat. When TA and situational stress are not congruent, the experience of an increased SA does not occur (Endler et al., 1991). The low threshold TA will exhibit as CA and SA with higher threshold. The predisposition to a particular experience (as seen in TA), engagement in a particular behavior (as in CA) and the individual's actual response in a specific situation (as seen in SA), distinguishes CA, SA, and TA (Endler, 1983). Although the cognitive elements in CA, SA, and TA differ, they predispose one to hyperarousal of the autonomic nervous system leading to somatic anxiety. It has also been found that disordered autonomic regulation of the cardiovascular system is linked to coronary artery disease and sudden cardiac death (Clark, 1988). Hence, when anxiety alters their autonomic tone, it is manifested by a decrease in vagal response and an increased sympathetic component,

thereby increasing the susceptibility to fatal ventricular fibrillation. The reduced heart rate variability in patients with a high level of anxiety has been shown to predict sudden cardiac death (La Rovere et al., 2003). Findings from Albert and colleagues' (2005) study suggested that chronic rather than acute effects of anxiety on cardiac electrophysiology are found to cause fatal ventricular arrhythmia which is of great importance. Evidently MAT establishes a relationship between anxiety and symptoms that affect an individual's performance and wellbeing. MAT similarly explains the multidimensional response of SA, TA, and CA that focuses on individual differences in the likelihood of experiencing somatic or cognitive symptoms. Hence, we recognize that SA, TA, and CA are multidimensional both theoretically and empirically.

Martens' MAT explicitly identifies and separates cognitive-worry and autonomic-emotional dimensions of state, trait, and cardiac anxiety. However, MAT also aids in the theoretical discussion of the relatedness among the association of the symptoms of anxiety and helps distinguish between different dimensions of state, trait, and cardiac anxiety. Since anxiety has been associated with increasing the sympathetic nervous system activity and leading to cardiac instability with an increase in susceptibility to ventricular fibrillation and sudden cardiac death (Albert et al; 2005; Kop et al., 2004), it is important to correctly diagnose and appropriately treat a person's specific type of anxiety disorder in order to decrease the negative consequences associated with the different types of anxiety. The culmination of the recognition of associated symptoms of anxiety would be particularly helpful in differentiating the type of anxiety appropriately and tailoring an effective treatment plan.

Figure 5: Sequence of Events in CA



Note. Created by Shajimon, B. 2012

5.7 Significance of the Study for Nursing Practice

The concept of preprocedural anxiety, particularly CA, has far-reaching importance to nursing practice. Professional nurses as direct care providers and Master's Advanced Practice Nurses (APN) and Doctoral Advanced Practice Nurses (DNP/DrNP) as educators are in a critical position to make an impact in the lives of patients experiencing cardiac specific anxiety. Given the potentially serious complications associated with untreated anxiety, precise and timely diagnosis is warranted, which rarely occurs as a part of assessment in a preprocedural unit or cardiology clinic. Patients with high levels of anxiety need to be identified preoperatively and offered interventions directed to reduce anxiety associated complications (Carr, Brockbank, Allen, & Strike, 2006). Nurses, including staff nurses and master and doctoral level nurse clincians play an important role in assessing patients in the preprocedural unit prior to any procedures. APNs and DNP/DrNPs have a better chance of screening patients for CA, SA, and TA

than physicians, because psychologists or cardiologists do not routinely screen patients undergoing cardiac procedures in outpatient or inpatient settings. In urban hospitals, it is extremely common for the APNs to round on patients and participate in both the admission to and discharge from the outpatient cardiac setting. These nurse clinicians are well positioned to help identify patients at-risk for sustained psychological distress.

Preprocedural physiological and psychological distress increases the duration of the cardiac procedure, sedative requirement (Nilsson et al., 2009), and the risk of CVD and cardiac mortality in patients with diagnosed cardiac disease, and it is associated with a poor long-term prognosis (McCann et al., 2010). Patients with an elevated heart–focused CA are likely to become more upset and worried about their heart related sensations and, as a result, tend to anxiously monitor their heart and pulse, avoid activities believed to bring on symptoms, repeatedly seek reassurance from healthcare professionals resulting in costly cycles of reassurance seeking doctors' visits and medical examinations (Aikens Michael, Levin, Myers, & et al., 1999; Eifert, Zvolensky, & Lejuez, 2000). DNP/DrNP clinicians in particular should be well versed in the evidence that supports establishing a therapeutic environment that could reduce the stress that elicits anxiety in clinical settings. As DNP/DrNP are educated to be active change agents in the healthcare system with a focus on improving the health of aggregate populations (Dreher, & Smith Glasgow, 2011), it is expected that they will seek to change or improve hospital environments or health procedures. Currently this role is under-recognized and underused, but it is emerging as more nurses in particular earn a doctor of nursing practice degree. Since patients with anxiety have increased medical need inflating the cost of care, assessing for anxiety among individuals with psychological distress and

behavioral problems is paramount. In the preprocedural unit, DNP/DrNP and APNs could use the opportunity to screen and diagnose patients with psychological distress and provide appropriate referral and treatment, but it is incumbent that they be educated appropriately to do this in their formal graduate nursing education. DNP/DrNPs and APNs should also be alert to patients with complex needs or potentially challenging assessments which might require physician or psychologist diagnosis. Appropriate interventions by these clinicians could reduce physical ailments, help patients cope with disease, decrease their lengths of stay and postoperative pain medication, increase patient and family member satisfaction with the process, and improve prognosis (Kruzik, 2009).

Anxiety is a treatable disorder; early treatment not only improves symptoms but also helps to prevent its other associated medical problems. DNP/DrNP and APNs need to focus on preventive efforts by identifying risk factors that produce anxiety in cardiac patients in outpatient preprocedural unit and cardiology clinics. Nurse clinicians, in diverse clinical settings such as the outpatient cardiovascular unit, need to incorporate brief, quick, and reliable anxiety screening assessment instrument into the assessment process. Routine screening for anxiety would enable early identification of clinically relevant anxiety and rapid initiation of interventions. Since anxiety is widely prevalent in general population, it thus represents a new frontier in the prevention of CVD. Clinicians must be tactical in identifying anxiety symptoms in patients who are at increased risk for sudden cardiac death. Future research should focus on finding the pathological levels of anxiety in patients exposed to stressors that most likely provoke anxiety that could increase the risk of CVD such as low socioeconomic status, unfamiliar health care environment, or a diagnosis HTN.

As previously stated, it is important to reemphasize that this study highly recommends that there is a need for doctoral advanced practice nurse clinicians to be diligent and adequately equipped with skills and resources to systematically identify those "at risk" and work with psychologists (or other trained mental health professionals) to develop specific interventions. However, evaluation of the clinically relevant anxiety disorder in preprocedural settings may direct appropriate treatment as it reflects a physiological milieu that mediates clinical outcomes. Since a significant amount of time in the preprocedural unit before the actual procedure is used to conduct routine assessments and obtain consent by the practitioners, a need remains for future research to evaluate the use of a short anxiety evaluation questionnaire that would focus on the three most prevalent types of anxiety, CA, SA, and TA, in a cardiac preprocedural unit.

5.8 Implications for Cardiac Medicine and Psychology

Identification of the most common or dominant anxiety in cardiac preprocedural unit and cardiology clinics is important for clinicians and nurses because it will help clinicians prioritize and develop appropriate and effective interventions. An interdisciplinary approach to identify and appreciate the anxiety-CVD relationship is important because it may yield a greater understanding of the interrelationship of the psychological, physiological, and disease process. By identifying the relevant anxiety, clinicians may identify likely stressors and offer appropriate treatments to hopefully effectively lower anxiety level.

To accomplish this goal, creating a state-of-the-art medical environment including cardiologist, psychologist, and doctoral advanced practice nurses in treating patients with cardiac related symptoms or disease process may help in early recognition of anxiety

related stressors and offer appropriate treatment. Promoting early collaboration among cardiovascular physicians and psychiatric services may help in providing effective treatment for cardiopulmonary & psychological distress. It may further prevent anxiety related adverse events by identifying risk factors and enhance recovery and decrease risk cardiac events. The multidisciplinary approach in the medical environment may also prevent pre and post procedural complications by early intervention in patients undergoing invasive cardiac procedures. Furthermore, facilitating appropriate referral and treatment regardless of their medical status may promote optimal treatment with fewer medications and reduce adverse events.

It is evident that the state of the mind plays a huge part in our well-being. Therefore, it is important for clinicians to make efforts to breakdown the cycle of worsening symptom severity, psychological and physiological distress, and healthcare utilization in cardiac patients. Convincing the cardiology community of the value of the state-of-the-art medical environment, which includes collaboration with psychologists, is more comprehensive that just the strict treatment of cardiovascular disease in isolation from its cardiac disease's psychological manifestations. A collaborative effort may effectively manage the bio-psycho-social influences on heart disease and increase the quality of life of those with CVD and perhaps even decrease the prevalence of disease. Psychologist may not only help these patients to deal with stress but may also help them comply with treatment regimens. Clinicians' awareness should be increased on the influence of psychological well-being on symptom relief and its effects on adherence to treatment regimen. Multidisciplinary sharing of knowledge and collaboration especially between psychology and cardiology will benefit the patients enormously. This

interdisciplinary collaboration may increase practitioners' ability to heal patients by improving coronary treatment and prevention. The multidisciplinary team can work with patients across the diagnostic continuum from those who are at risk for CVD to those who have experienced a cardiac event. Thus, the focus in these settings should be on facilitating behavioral change in an effort to reduce cardiovascular risk factors. Collaborative effort will lead to coordinated intervention which may help in optimizing the cardiac patients physical, psychological, and social functioning and reducing morbidity and mortality (Molinari, Compare, & Parati, 2006).

5.9 Study Limitation

The findings of this study were inferred considering the several existing limitations. This study mainly had four limitations:

1. Potential selection bias related to recruitment due to use of a convenience sample and relative small sample size, although adequate power was used to evaluate the main hypotheses. However, the lack of power due to use of multiple predictors to find any relationship with the outcome variable and unpredictability on the number of variables that needed to be controlled reduced the sample size. A larger sample would have eliminated Type II error.
2. Self-report measures which provide only real time subjective descriptions of behaviors and feelings of the respondents and individuals still may not have responded truthfully. Therefore, it has a potential for inaccuracy over time.
3. There could be uncertainty in the respondents answer, since it was unknown if the stress was independent of anxiety as stress level was not measured. Moreover, the cross-sectional nature of the study also did not allow detection of relative stability of

the observed effects. However, it was evident that there was no modulation in anxiety due to drug therapy, because the majority reported not being on psychiatric medication at the time of participation (n = 70, 76.1%), only 24% were on medication for anxiety, depression, or bipolar disorder.

4. There was a lack of generalizability due to a homogeneous population recruited from a single site. Selection bias cannot be eliminated due to the design of the proposed study; bias can be minimized through the random selection. Although all patients were scheduled to undergo elective cardiac procedures, the sample was not totally a homogenous group, because more than half of the group had experienced a prior cardiac procedure. The samples were also predominantly Caucasian and were older adult patients with a relatively high CVD diagnosis. Therefore, it is unclear whether these results would be generalizable to other locations with different ethnicity, cardiac diagnoses (e.g., postcoronary artery bypass graft surgery or automatic implantable cardioverter device) or age group (e.g., middle-age adult or frail elderly).

However, the study data represented an important addition to previously published studies on this topic where men predominated in study recruitment. The stepwise non-regression method employed to detect predictors of anxiety was strength; however, this method reduced sample size and most likely the descriptive capacity of the regression model. Based on the findings, it would be reasonable and appropriate to provide tests across time in future work on this topic. Perhaps patients with CA should be followed longitudinally when they are first given a diagnosis of a potential cardiac disease. Follow-up measures of their disease trajectory could help better understand the effects of CA over time.

5.10 Recommendations

Anxiety, especially CA has been under-appreciated in patients undergoing invasive cardiac procedures. An explicit assessment and recognition of specific heart–focused and situational anxiety in patients with and without heart disease in various medical settings such as primary care clinics, emergency departments, and preprocedural units could be helpful in defining our understanding of psychological problems and useful in tailoring specific treatment plans. It is crucial that clinicians diligently assess patients for anxiety in their routine examination and provide appropriate treatment to enhance recovery and decrease patients' risk of cardiac events. Routine assessment of patients' anxiety levels is recommended so that accurate diagnoses can be made on targeted patients and resources focused on specific groups rather than on most patients who experience fairly low levels of anxiety. Early recognition of psychological problems, particular those that fall within the realm of the DSM-IV-TR could facilitate appropriate referral and treatment of such patients regardless of their medical status. Therefore, it is important to have a quick and more accurate diagnosis to minimize functional impairment, increase quality of life, and reduce healthcare costs. An accurate recognition and diagnosis of specific anxieties in a medical setting, especially the preprocedural unit, can help clinicians relate core psychological and physiological processes and focus treatment on an identified clinically relevant anxiety. Evaluation and treatment of CA in patients, especially those who are undergoing invasive cardiac procedures, may very well prevent complications, reduce burden on the health care system, and reduce emotional and financial burden to those experiencing noncardiac

chest pain. Appropriately targeted treatment should reduce symptoms, associated complications, and prevent relapse.

5.11 Future Study in Nursing

The following should be the focus of future research:

1. Explore the extent to which preprocedural CA and SA impacts outcomes in patients undergoing invasive cardiac procedures.
2. Address development of a more specific and brief scale that could be used in preprocedural units to identify clinically relevant CA, SA, and TA so that effective treatments can be offered immediately.
3. Focus on finding the pathological levels of anxiety in patients exposed to stressors such as low socioeconomic status, unfamiliar health care environment, and a diagnosis of HTN that could most likely provoke anxiety, which would increase the risk of CVD.
4. Investigate the effect of elevated levels of CA on health outcomes in the context of the increasing number of patients undergoing both elective CATH/PCI and EP study.

5.12 Chapter Summary

This study mainly focused on preprocedural anxiety in patients waiting for invasive cardiac procedures in an outpatient preprocedural unit. The main outcome variables of the study were CA, SA, and TA as anxiety is composed of various dimensions underlying different aspects of vulnerability to the phenotype (Smoller & Tsuang, 1998). In this sample, a moderate level of SA and TA were found compared to a low level of CA. The data from this study indicated that patients in a preprocedural unit have a higher level of SA compared to CA. This is possibly due to the fact that in the preprocedural unit

patients are most concerned and focused on their situation, the procedure they are waiting to undergo, and the associated complications and outcome of the procedure, all of which can elicit SA. The significant correlation of SA with a negative psychological state and physiological event has further stress that SA should be recognized in the preprocedural unit and treated appropriately to reduce associated complications. CA on the other hand is more a chronic type of anxiety which is more likely to develop when patients first experience cardiac related symptoms and/or are given a possible diagnosis of heart disease. This anxiety develops in the outpatient setting, and it persists over time increasing the risk of cardiac arrhythmias and death related to heart disease. Therefore, it is important to diagnose and manage this condition appropriately in the outpatient cardiology clinic or doctor's office where the patient is been seen. Clinicians must take the initiative in addressing the psychosocial issues in cardiac outpatient clinics or offices as well as the inpatient units to prevent pathological, psychological, and physiological events that could contribute to an increase in cardiac mortality. Albeit, when clinicians identify the specific type of anxiety in patients in an outpatient cardiac clinic or preprocedural unit, they could possibly help patients manage their anxiety by addressing the specific cause of their anxiety and offering appropriate treatment. In the outpatient cardiology clinic, CA should be more prevalent due to its chronic nature mainly focusing on the heart and heart related symptoms. However, in the preprocedural unit, SA could be more common due to patients' concern with the situation, procedural outcome, anticipation of adverse effects and complications, and even life-threatening events. Providing information on the possible cause and its management could be reassuring to the patient (Lunden et al., 2006).

5.13 Study Conclusion

Anxiety and CVD frequently coexist and evidence has suggested that anxiety may be an independent risk factor for CVD, along with leading to poorer outcomes. In addition, individuals who experience symptoms related to cardiac disease, develop heart–focused CA. When they are admitted into the preprocedural unit to undergo invasive cardiac procedures to be diagnosed either or treated for a cardiac disease, they may experience intense SA due to environmental stress, procedure, complications, outcome, and being given the diagnosis of life-threatening heart disease. The findings from this study have supported the findings of other studies reported in the past that patients with TA express a high level of SA, an acute stress disorder under threatening circumstance, and they develop chronic illness focused CA while being cared for heart related symptoms in the clinic. It is important to identify and support the vulnerability mechanism in the expression of TA as symptoms of SA and CA. Epidemiological evidence has suggested that anxiety increases the risk of developing heart disease. However, chronic anxiety increases the risk of heart disease by influencing health behaviors such as smoking, promoting atherogenesis by increasing risk of HTN, triggering fatal coronary events, either through arrhythmia, plaque rapture, vasospasm, or thrombosis. Since anxiety is associated with abnormal cardiac autonomic control, it may increase the risk of fatal ventricular arrhythmias (Haines et al., 1987; Kawachi, Colditz, & et al., 1994; Kawachi, Sparrow, & et. al., 1994; Kubanski et al., 1998). Patients who experience symptoms related to heart disease or have been diagnosed with a heart problem experience persistent heart-focused anxiety or CA which could become chronic in nature and progress to a dangerous level requiring long-term psychotherapy. Because

CA is a type of chronic anxiety type, it may also increase the risk of heart disease and related mortality. From this study all variables (CA, SA, and TA) had been identified as potentially influential. Therefore, patients who are seen routinely in cardiology clinics or admitted for invasive cardiac procedures in an out-patient preprocedural unit should be assessed for anxiety. Interventions to prevent or reduce anxiety should be provided since higher level of anxiety is distressing for patients and is predictive of poor outcome. Nurse clinicians in particular should contribute towards disentangling the multidimensional nature of anxiety in the cardiac preprocedural unit by incorporating anxiety assessment with their routine care.

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APPENDIX A: LETTER OF SUPPORT

Letter from Dr. Charles D. Spielberger

Binu Shajimon, MSN, CRNP-BC
Nursing Student, Drexel University
Philadelphia, PA

Dear Mr. / MS Shajimon,
Thanks for your email confirming that you received my signed letter, giving you permission to reproduce and use our State-Trait Anxiety Inventory (STAI) in your dissertation. I sincerely hope that our anxiety measures could prove helpful in your research and look forward with great interest to hearing about the results of your study when these are available. Very best wishes.

Charles D. Spielberger, PhD, ABPP, Distinguished Research Professor and Director, Center for Research in Behavioral Medicine and Health Psychology, Department of Psychology PCD 4118G University of South Florida, 4202 East Fowler Avenue, Tampa, FL 33620-7200. Phone (813) 974-2342; Fax (813) 974-4617; Email: spielber@usf.edu

From: Binu Shajimon <bbbshajimon@yahoo.com>
Subject: Drexel Doctoral student - Request for STAI
To: spielber@usf.edu
Date: Wednesday, September 7, 2011, 10:57 PM

Dear Dr. Spielberger,
I am currently a second year nursing doctoral student at Drexel University in Philadelphia, PA. I am interested in the topic "Pre-op state and trait Anxiety" for my dissertation. This email is to kindly requesting permission to use the STAI form-Y

developed by you for my research. Kindly let me know, in elderly population age over 70 years can I use this? If not, what would you recommend? All information on STAI form - Y is for population under 70 yrs. Are there any other formalities to obtain the questionnaire? Please advise and do not hesitate to contact me should you require any further information. Thank you.

Sincerely,

Binu Shajimon, MSN- CRNP-BC
Hahnemann University Hospital
215-762-4585 (W)
267-253-0136 (C)

Letter from Dr. Georg Eifert

From: Georg Eifert <geifert@chapman.edu>

To: Binu Shajimon <bbbshajimon@yahoo.com>

Sent: Wed, May 11, 2011 11:12:19 AM

Subject: Re: Drexel Doctoral Student

Dear Binu,

Please go ahead and use the questionnaire — just acknowledge source and authorship in all written documents.

Best wishes for your research.

Georg H. Eifert, Ph.D.

Professor & Head of Psychology Faculty

Crean School of Health & Life Sciences | Schmid College of Science | Chapman University

Orange | CA 92866 | USA | phone: 714-628-2729 | fax: 714-997-6780

http://www.chapman.edu/SCS/HLS/faculty/eifert.asp

From: bbbshajimon@yahoo.com

To: Georg Eifert geifert@chapman.edu

Subject: CAQ

Date: 5/10/11

Dear Dr. Eifert,

I am currently a second year nursing doctoral student at Drexel University in Philadelphia, PA. I am interested in the topic "Cardiac Anxiety" for my dissertation. This email is to kindly to request permission to use the Cardiac Anxiety Questionnaire developed by you for my research. Kindly let me know, if there are any other formalities

to obtain the questionnaire. I would also greatly appreciate it if you would give me your expert opinion / suggestion on my proposed dissertation question. My question is to measure the level of cardiac anxiety vs. preprocedural (state) anxiety in patients undergoing outpatient cardiac procedures and stratify based on age, gender and race. In your opinion is there a gap existing in this area or do you have any other suggestions. Please advise and do not hesitate to contact me should you require any further information. Thank you.

Sincerely,

Binu Shajimon, MSN-CRNP-BC
Hahnemann University Hospital
215-762-4585 (W)
267-253-0136 (C)

APPENDIX B: QUESTIONNAIRES

Cardiac Anxiety Questionnaire-Revised (CAQ-R)

The questionnaire, Cardiac Anxiety Questionnaire-Revised (CAQ-R), utilized in this research study is a copyrighted document. Therefore, the questionnaire is not included in this dissertation Appendix.

The Spielberger State-Trait Scale Form–Y (STAI-Y)

The questionnaire, The Speilberger State-Trait Scale Form-Y (STAI-Y 1), utilized in this research study is a copyrighted document. Therefore, the questionnaire is not included in this dissertation Appendix.

The questionnaire, The Speilberger State-Trait Scale Form-Y (STAI-Y 1), utilized in this research study is a copyrighted document. Therefore, the questionnaire is not included in this dissertation Appendix.

Demographic Questionnaire

ID# _____

Scheduled Procedure: □ Cath /PCI _____ □ EP S_____

First Invasive Cardiac procedure: □ Yes □ NO

Gender: □ Male □ Female

Age (years)* _____

Race:

□ White □ Black / African American

□ Asian/ Pacific Islander □ American Indian /Alaska Native

□ Hispanic or Latino □ Native Hawaiian

□ Two or More Races □ Some other race

Ethnicity:

□ Hispanic White or Latino □ Hispanic Nonwhite □ Others

Marital Status:

□ Single (never married) □ Married □ Divorced

□ Widow/Widower □ Separated □ Living with significant other

□ Recognized civil or domestic partnership □ Other

Years of education: _____

□ Some High school or less

□ High School graduate

□ Some college or associate degree

□ College Graduate /Bachelor's degree

□ Post graduate / professional degree

Employment:

□ Employed □Part Time □Full Time

□ Unemployed □ Self Employed □Out of work due to health issues

□ Disabled □Student □ Retired (mandatory or voluntary)

Annual Household Income:

□ Under $15,000 □ $15,000 to $24,999 □ $25,000 to $34,999

□ $35,000 to $49,999 □ $50,000 to $74,999 □ 75, 000 to $99, 999

□ $100,000 and over

Check all the problems you had or currently have:

□ Heart disease □ High blood pressure □ Stroke

□ Previous Cardiac Catheterization □ Previous Electrophysiological procedures

□ Anxiety □ Depression □ Smoking

□ History of Recreational Drug use □ History of Alcohol use

□ Recreational Drug use within the past 72 hours □ Alcohol use within the past 72 hours

List all medications that you are taking:

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

(This is a modification/adaptation of a noncopyrighted questionnaire http://grants.nih.gov/grants/guide/notice-files/not-od-01-053.html; http://pubdb3.census.gov/macro/032007/hhinc/new06_000.htm)

Screening Questions

ID#____

- Are you diagnosed with or currently been treated for dementia? □ Yes □ No

ONLY YES EXCLUDES FROM THE STUDY

- Are you diagnosed with or currently been treated for the following conditions?

□ Congestive heart failure □ MI □ Angina □ diabetes □ PVD □ high blood pressure □ Cancer □ COPD □ Stroke □ kidney failure/dialysis □ Arthritis

□ Any other major health conditions_____

PATIENTS WITH CHF AND 5 OTHER CONDITIONS WILL BE EXCLUDED FROM THE STUDY

1. Do you feel tired/fatigue and depend on others for carrying out the activities of daily life?

□ Yes □ No □ Need some Help

2. Because of your health or a physical condition, do you have any difficulty with the following physical activities:

a) Walk 10ft

□ No difficulty □ Some difficulty □ A Lot of difficulty □ Unable to do

b) Open your medication bottles

□ No difficulty □ Some difficulty □ A Lot of difficulty □ Unable to do

c) Bathing or Shower

□ No difficulty □ Some difficulty □ A Lot of difficulty □ Unable to do

3. Any Weight loss > 10 lbs lost unintentionally in prior year □ Yes □ No

>3 CRITERIA (LOT OF DIFFICULTY OR UNABLE TO DO) PRESENT IS POSITIVE FOR FRAILTY AND COULD BE EXCLUDED FROM THE STUDY

(Based on Cardiovascular Health Study Measure)

(Rockwood, Fox, Stolee, Robertson, & Beattie, 1994; Pel-Littel, Schuurmans, Emmelot-Vonk, & Verhaar, 2009).